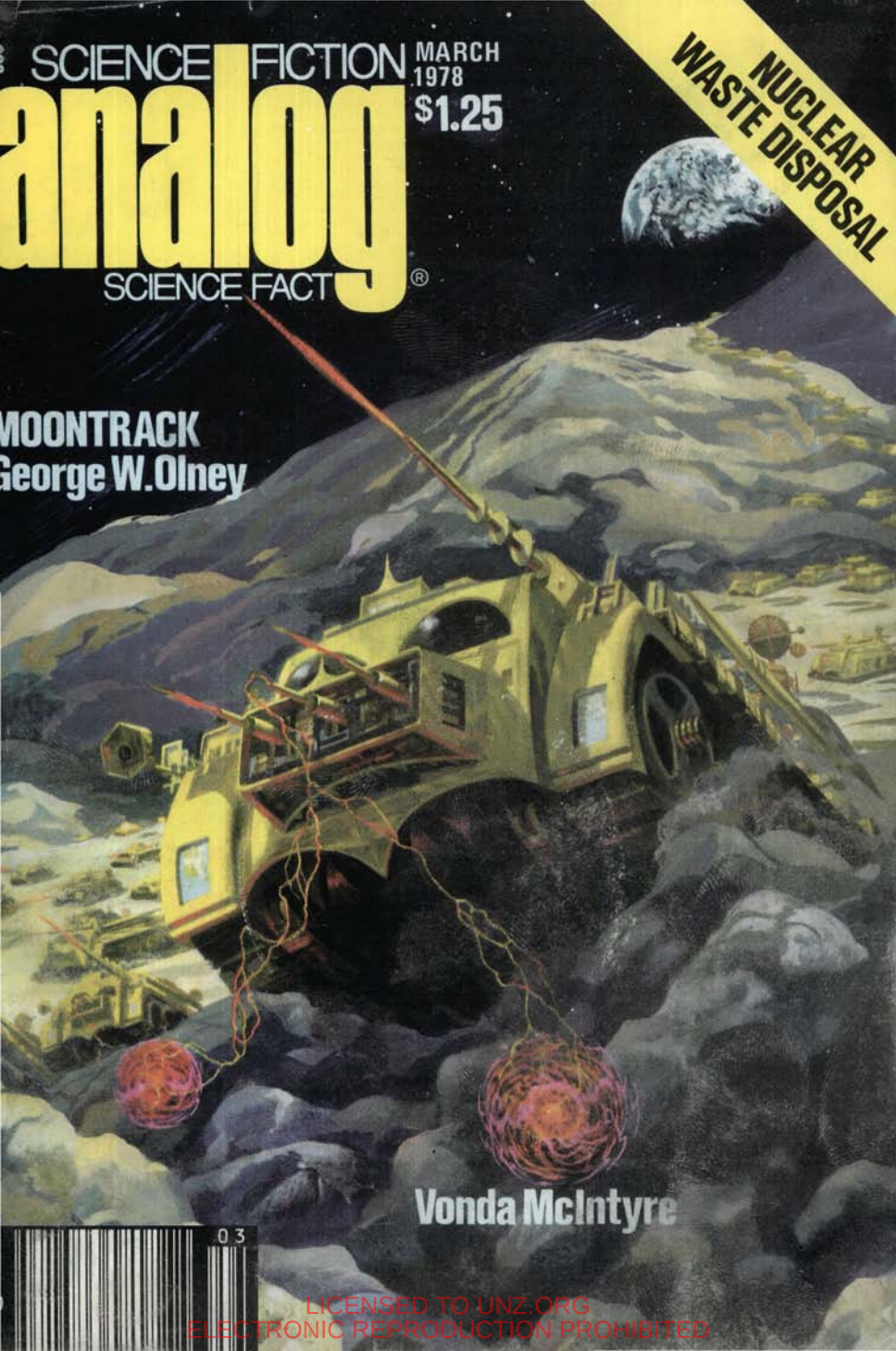

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MicroGame 5...

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Game design by Robert Taylor / Illustrations by Russell Ansley

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MicroGame 6...

WIZARD

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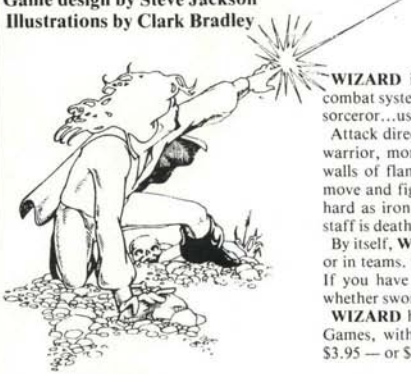
Illustrations by Clark Bradley



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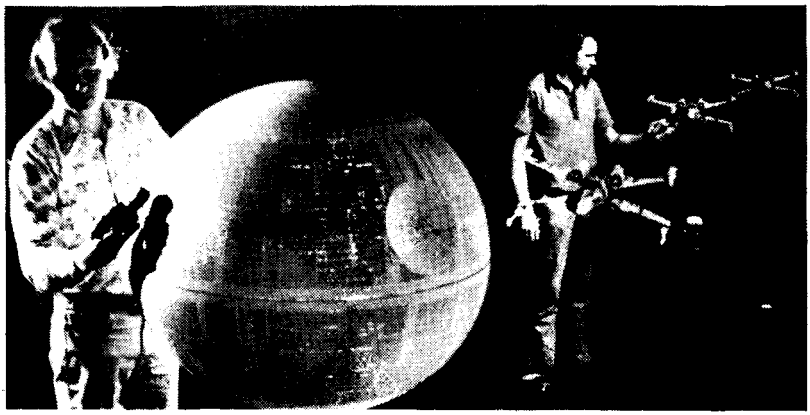

INTERVIEWS

Princess Leia
Carrie Fisher

Darth Vader
David Prowse

Chewbacca
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SCIENCE FACT

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analog books

In journalism classes, you learn that every good news story should begin with "Five W's:" What, Who, When, Where, and Why.

We have good news. Analog is going to produce a series of science fiction books. What will they be like? Novels by new writers (and some more-established ones, from time to time). Reprints of classic stories from the Golden Era of the old Astounding. Anthologies of all new stories, especially written for Analog, similar to the ANALOG ANNUAL we published in 1976. Very likely, the series will include one or more anthologies based on the UNKNOWN WORLDS fantasy magazine, of treasured memory. And there will be other books, different kinds of books, as the series goes on.

Who's going to do this? The best writers we can publish, of course. And an editorial team that starts with the Editor of Analog magazine, and includes the Analog staff, freelance book editors, as well as the science fiction editors of Baronet Publishing Co. and Ace Books.

Baronet is a new publishing company, and will be bringing out the trade editions of Analog Books. In the publishing industry, the term, "trade edition" means books sold primarily in bookstores. Once that meant strictly hardcover books. But today, more and more trade editions are being produced as quality paperbacks: that is,

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books that are in every aspect like a hardcover book, except for the less expensive binding. Analog Books' trade editions will be primarily quality paperbacks, to keep their prices within reason, although a certain number of hardcover books may be produced for the library market.

Ace Books is now a part of the Grosset & Dunlap publishing establishment, under the new management provided by G&D, and with a new science fiction editor, James Baen (formerly editor of Galaxy magazine).

Ace is one of the major publishers of science fiction books in the mass-market paperback format. "Mass market" paperbacks are the ones you find in supermarkets, drugstores, airports, newsstands—even in bookstores. Ace will produce the mass-market paperback editions of Analog Books. And because of the differences in format, audience, and distribution, there will be differences in the contents of some Analog Books between the trade and mass-market editions.

The "who" of Analog Books also includes the top science fiction illustrators, and the art directors of Analog, Baronet, and Ace. Many of our books will feature interior illustrations.

When and Where will Analog Books become available? Within a couple of months, the first books should appear. We will offer them for sale through this magazine, of course, with convenient order blanks and full information about titles and authors. In addition, Analog Books will go on sale in bookstores and all the mass-market outlets that we can reach.

Why are we doing this? After all, Analog has been a successful magazine for nearly fifty years. Why go into the book business? There are three main reasons.

1. Demographic studies have convinced us that there is an entire generation of readers who have grown up without ever realizing that good fiction can be found in magazines.

Before 1950, magazines were a major source of fiction all across America. Most of the best-known writers of the twentieth century, from O. Henry to O'Hara, from Hemingway to Heinlein, appeared first and most often in magazines. But with the advent of mass-market paperback books and television, the magazines that specialized in fiction—such as The Saturday Evening Post, Bluebook, Colliers, et al—died away. Today, magazine fiction is either soap opera stuff, pornography, detective mysteries, or science fiction. The general fiction, for the broad audience of average readers, no longer appears in magazines.

Yet there is a strong and growing audience that reads science fiction avidly. In books. They buy their science fiction at their bookstores, or in airport kiosks, *and do not realize that there are magazines that publish science fiction monthly.*

Analog Books will be a way of informing them that science fiction magazines are alive and well (one of them, anyway). And at the same time, we will be bringing Analog quality

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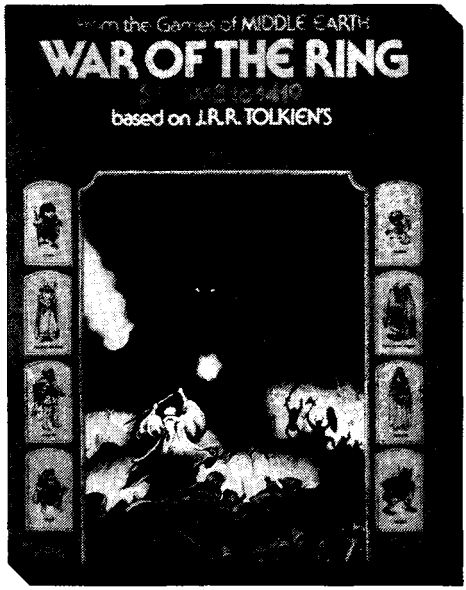

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stories and art to the book-buying audience.

2. There are literally hundreds of classic science fiction stories that are simply not available in books. Many of the best stories from the forties and fifties were anthologized two or three decades ago, and are now out of print—and out of mind, as far as most readers are concerned. We want to make those stories available again.

It's often been said that if you ask any fervent science fiction reader when the field's Golden Age was, the answer comes out to the time when the reader was a teenager and first began reading SF. Today, the consensus is that science fiction's Golden Era was in the forties, But there is a strong (and growing) minority opinion that the fifties were "truly" the Golden Age. Analog Books will present anthologies from both these eras, featuring the stories that many of us remember, but many others have only distantly heard about, and never had the chance to read.

These "Golden Oldies" should be of special value in science fiction classes. The anthologies now used in most SF courses tend to fall into one of two categories. Some are highly specialized in subject matter: anthropology through SF, sociology through SF, bricklaying through SF, chainsmoking through . . . well, you get the picture. Other anthologies are strictly historical in approach: they start with Plato or Lucien of Samosota and give a story or two from each major "epoch" of our field, usually ending with an acid-dropping nightmare from the sixties.

It should be extremely helpful, to those teachers and students who seriously want to understand science fiction's rich and varied past, to have anthologies that give some depth and feature the best stories, writers, and artists of a given time period.

3. There are also "Golden Youngies" to be considered. Science fiction is *the* field of literature, today, where new writers are encouraged. We intend to make Analog Books an opportunity for new writers to break into print. And by "new" we don't mean only "young." Many of the best writers this field has produced turned to writing SF in their mature years, as a sideline to other careers.

Even in the science fiction field, the opportunities for new writers are relatively few. It is difficult for a writer who has not established his or her name to compete with the well-known and well-read "old reliables" of the field.

The reason is largely economic. Publishers are in business to make money. If they don't make a profit, they go out of business. They know that readers tend to buy fiction by the "brand name:" that is, they look for the authors that have pleased them in the past. New writers have to overcome that lack-of-recognition obstacle.

We are hoping that the "brand name" of Analog Books will encourage readers to take up books by new and relatively unknown writers. We are especially interested in publishing

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those science fiction novels that new writers find so difficult to sell to other publishing houses.

Analog magazine has had a long and marvelous tradition of developing new writers. The John W. Campbell Award, given each year to the Best New Writer of the Year at the world science fiction convention, is a commemoration of this tradition. But a magazine cannot publish more than three or four novel serializations per year. There are lots more good SF novels out there, and Analog Books will be an outlet for them.

The first novel Analog Books will publish will be by a writer whose first work of short fiction appeared only last August: Orson Scott Card. His novel is titled *Hot Sleep*, and it will be the first of many brand-new novels by writers whose names are relatively new to the science fiction audience—but won't be for long.

That's the What, Who, Where, When and Why of Analog Books. Now it's time for the Editor to stop talking and start working. And listening.

What kinds of books do you want to see? Should we offer Analog Books on a subscription basis, more or less like a book club? Which writers—past, present, and future—would you most like to read? Analog magazine has always had a very loyal and extremely vocal readership. Now's the time to tell us what you think of the ideas we have discussed so far, and to make suggestions.

THE EDITOR

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George W. Olney

attle is ninety percent organization,
en percent inspiration,
nd one hundred percent emotion.

MOONTRACK

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Excerpt From a Lecture on the History of Spatial Warfare Delivered by Khan Ordvin, University of Vega

We have studied other forms of spatial conflict during this course, but, being human ourselves, the human wars interest us the most. The beginnings of human spatial warfare can be traced to those elements basic to human character. The reason for the BEM War was the destruction of the first manned Mars Probe, some five Solar years after the early settlement of the Moon by one of the old Nationalistic divisions.

Settlement, by the way, is too grand a word in this case. Actually, there existed on the Lunar surface a quasi-military base with the mission of scientific research.

In any case, the destruction of Marsprobe One set that government off on a path compounded of equal parts bravado, romanticism, calculated response, and naive adaptation. Those of you that are human warfare students will recognize almost that same process when the airplane was first used on the field of war . . .

JCS Intelsitstat #6—Destruction of Marsprobe One

Satellite infrared photos definitely show destruction as stemming from a heatbeam projected from the Moon's surface (see attch. 1, keyed map). Recommended courses of action will be forwarded ASAP.

TOP SECRET—Chairman, JCS to CoS Army

Tom,

The President has firmly rejected nuclear response to the unknown base identified in the satellite readouts of the Lunar surface. Apparently Carlton has lost out on radio negotiation as well. Limited response will be the buzzword with these unknowns. You have the ball, give me a quickie plan tonight.

Al

Further Excerpt From the Lecture of Khan Ordvin

The introduction of troops to the Moon was an idea so revolutionary at the time that it is difficult for us to grasp the situation today. Every treaty then in force forbade the use of military force off of the Earth's surface. No such thing as troop transportation had been tried up until that time, and it was with jackleg adaptation that the first soldiers, a battalion of Rangers (refer to your texts for references), were transported on a mission of armed reconnaissance.

It is a pity that they did not do better.

JCS Intelsitstat #17—Initial After-action Report, Operation BEM . . .

Approximately 370 plus casualties accounted for among Ranger force, 345 dead of that total . . . no officer survival . . . good picture of the surface structure has been gained from survivors . . . enemy definitely identified as extraterrestrial . . . base constructed along best lines of defense for

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spatial attack, and nearly impregnable to light infantry attack . . . aliens showed extreme familiarity with light infantry tactics and counteraction. In light of assessed information, further use of a light force such as the Rangers must be considered tantamount to suicide.

From the Desk of the President

****TOP SECRET****

Al,

I deeply regret the loss of over 80% of the Ranger force. With that in mind, though, I still feel that the policy of limited response is the right one to follow. It is now my belief that the initial response was *too* limited. Think that over and see me in about three hours.

Minutes of JCS Meeting Ref. OP BEM II Note: Speaker key furnished under separate cover. ****TOP SECRET****

Excerpt #4

Speaker A: Do you seriously mean to stand there and tell me that you propose the use of a mechanized force on the Moon?

Speaker K: The proposal is not as unreasonable as some of the others that we have heard here today. Look at the screen, you will see a film of a mech force taking a target similar to the alien base. You have all seen the feasibility study, you know that such an operation can be supported. Lift capability is no problem, and functional ability of the new family of Lunar vehicles is the same as that of the Mechanized Infantry Combat Vehicle from which they stem. The base itself is wide open to mechanized attack, almost as though they had no conception of the idea.

Gentlemen, the alien base has begun to destroy our orbiting satellites. It is my belief that we are being systematically run out of space. I feel that this is our only solution.

Speaker D: What about the cost of transporting fifty of those eleven-ton beasts to the Moon? Is it worth it?

Speaker K: What is survival worth? More to the point, we do not have to transport all fifty. Moonbase has thirty HLTV's of which twenty-seven are functional. The nuclear powered Heavy Lunar Transport Vehicle will be our Lunar MICV. With the lesser number of vehicles required for transport, along with the weapons ammunition and gear of a heavy infantry combat team, the payload would come to about a third of that required for the original Moonbase lift. Since we have four times as many shuttles now, the lift becomes expensive but practical.

Speaker L: Gentlemen, the layout of the base tells us something of their combat capabilities. The aliens, whatever the reason for their hostile acts against us, are extremely familiar with two forms of combat. Their capacity for spatial combat is tremendous, and they have developed what we commonly think of as light infantry combat to a high art. In that last field, they are as good as any we have ever faced.

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Speaker A: What you are trying to tell us is these things, or whatever, can beat us at the same game we ourselves have been playing for thousands of years. Correct?

Speaker L: In essence, Sir, yes.

Speaker B: As long as we are talking about transportation of these machines, has anyone here figured the cost of reconversion of the HLTV's and transportation of the unit back to Earth?

Speaker K: You had better reexamine the situation, (name deleted), nothing says that we can bring these troops and weapons home again. This base is not just carrying out the whims of its commander. They have definite instructions that they are following. What will happen when they find out what we hope to do to their base, I do not know. However, do you honestly believe that it will end here?

Excerpt End—Excerpt #4 of 72

****TOP SECRET****

The 1st Battalion (Mechanized) of the 72nd Infantry found itself assembled in the battalion parking lot, a rather puzzled bunch of young men. Something big was definitely in the wind. They had been told to be ready to ship out within twenty-four hours, the battalion was at full strength for the first time in human memory, and they had been told they would be addressed by an unnamed high ranker. The older NCOs smelled trouble, and they were wondering just what sort of God-awful mess they would be called into this time.

Settling national problems was nothing new for this outfit. They had been called upon to engage in acrimonious dispute with other national forces from the time of the unit's founding during the First World War through the Bolivian War. It was their profession, and they were good at it. A knowledgeable observer could note the way they wore their fatigue coveralls, the precise adjustment of their blue scarves, and the go-to-hell angle of their berets and get a reasonably accurate estimate of the battalion's fighting ability.

First Lieutenant Robert Bary had two major loves in his life. One of them was the First Platoon of Bravo Company, the "King Cobras." Not that that collection of yardbirds was a continual and unalloyed joy, but the good times more than made up for the bad. His other love was his wife, a lady who occasionally felt that she ranked number two in his priority list. Even Bob could never exactly say which came first.

Right now, however, she was very much on his mind, even in the middle of the formation. She was in her eighth month, and Bob was worried with the same concerns that have deviled new fathers from time's beginning. He had hoped to be present for the birth of their first child, but it looked like the Army was about to do it to him again.

He snapped out of his funk as he heard his platoon sergeant, SFC Sheffield, snarl at one of his men to be quiet. Several officers were climbing

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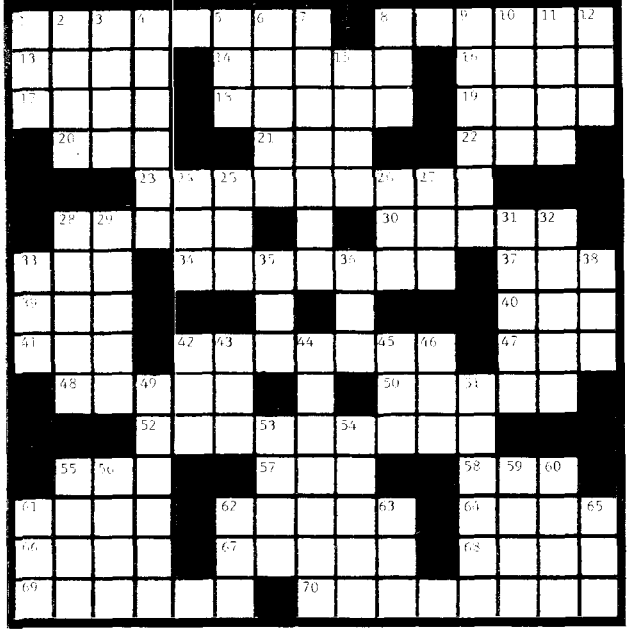
Science Fiction/Felix Polz



ACROSS

1. Editor of *Astounding* and *Analog*
8. Wrote *The City and the Stars*
13. Athletic organization (abbrev)
14. New fundamental particle
16. Hindu musical improvisation
17. Author of *A Plague of Pythons*
18. Mass of cast metal
19. Speed (abbrev)
20. Homicidal computer
21. Located (abbrev)
22. To have, 3rd person
23. Sister galaxy
28. Organization (abbrev)
30. Entertainer
33. Moon lander (old abbrev)
34. _____ Haderach (*Dune*)
37. Tint
39. Measures ground speed (abbrev)
40. Being
41. Word (French)
42. Spice of Arrakis (*Dune*)
47. Type of blood pressure (abbrev)
48. Bacterial virus
50. First manned lunar lander
52. Motto of the lunar rebels (acronym) *The Moon is a Harsh Mistress*
55. Type of machine-gun (abbrev)
57. Uptake of iodine (abbrev)
58. Bombs from orbit (abbrev)
61. Prefix, used as diminutive
62. Place of popular assembly (Greek)
64. Hymenopterous flying insects
66. Westernmost of the Aleutians
67. Used to make chocolate
68. "THEM"
69. Wrote *Foundation and Empire*
70. Author of *Have Spacesuit, Will Travel*

DOWN

1. "Adjutant General" of the Navy
2. Aircraft available (military abbrev)
3. Stomach (Finnish)
4. Second largest asteroid
5. Type of quality control inspection (abbrev)
6. Pertaining to the moon
7. Shallow waters within coral atolls
8. Circuit (abbrev)
9. Massachusetts location of Miskatonic University
10. *Rendezvous With* _____
11. Mass rate of flow (abbrev)
12. Type of air speed (abbrev)
15. Wander
24. Close relative (abbrev)
25. Digital Display Control and Warning Light (aerospace abbrev)
26. Treatment for suicidal depression (abbrev)
27. Twelve (abbrev)
28. Ancient Greek compiler of SF/Fantasy
29. E. E. "Doc" _____
31. Perfect
32. Intellect Master of the Garden of War (*The Star Fox*)
33. Stereotyped alien invaders (abbrev)
35. Sick
36. Girl's given name
38. Telepathy (abbrev)
42. Gyroscopic term (abbrev)
43. Even (poetic)
44. Capital of ancient Syria
45. Daughter of Chaos
46. Armed Forces of Earth (abbrev)
49. Auricle
51. Planetwide
53. Epic tale
54. Ectoplasm
55. Units of information
56. _____-matter
59. _____ Gesserit (*Dune*)
60. Project Cyclops was an example (acronym)
61. Association of mathematicians (abbrev)
62. Hovercraft (abbrev)
63. Early ordering information (logistical abbrev)
65. Employee Identification Number (abbrev)

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the platform in front of the formation. In the lead was Lieutenant Colonel Michael Kevy, the battalion commander. The real shocker, though, was the next two men behind him. Bob Bary's eyes got big as he recognized the Division Commander and the Army Chief of Staff. He could hear the muttering go still among the men. Those characters might not be able to recognize the faces, but they definitely recognized four stars. This was the first time in the lives of many of them that they had ever seen a four star general.

"Stand at ease, men," were LTC Kevy's first words. Then he went on to make an introduction for the Chief of Staff and the other officers on the speaking platform. With the inborn common sense of GIs, the troops tuned out the introductions and waited patiently for the highest ranker on the platform to tell them what they were doing on the parking lot this morning. Nothing said before that would mean much, and everything afterwards was add-on.

The Chief of Staff was Army to the core of his soul, steeped in Army habit. He proved it by using the traditional address that every high ranker uses when he wants to impress the troops, "Good morning, men. I want all of you to break ranks and fall in around the platform. I want everyone to hear just what I have to say."

As they grouped around the platform, everybody figured that this was running true to form and the next announcement out of the speaker ought to be a dandy.

It was.

"Gentlemen, I have chosen this battalion to go to the Moon." The Chief of Staff's bald statement immediately riveted attention. "Many of you know that our Marsprobe One was destroyed last month, but none of you knew until now that it was as the result of enemy action. Men, we are now in a war with extraterrestrials, Bug Eyed Monsters if you will, located in a base on the Moon. This battalion has been chosen to go up there and clean out that base."

In the back of the King Cobras, Pvt. Samuels decided that the time had come to go AWOL again.

The Chief of Staff continued, "I know this unit very well, because I was fortunate enough to be its commander during the Vietnam War. That told me I can be sure the mission will be accomplished. Gentlemen, I am personally giving you the mission of kicking hell out of those BEMs, and I know you can do it."

There was some more in this vein, and the battalion listened enough to laugh at the appropriate spots. Otherwise, they payed little attention. Their minds were on the devastating statement that he had made. Their ears picked up again as LTC Kevy came back to the mike.

"Men, we will now begin a period of intensive training, hard training. As of this moment, nobody will leave the battalion group. As you leave the platform, you will pick up your gear and board one of the line of buses directly

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to your rear. We will be taken to Marchand Air Force Base, and flown to Camp MacGregor, in White Sands Test Area. There we will begin our field training for the Lunar mission.

"All right," he continued, "First Sergeants board your companies. All officiers will ride in the first bus with me and get your first briefing. Dismissed."

Samuels thought about making a break for it as everyone was boarding the buses, but noticed Sergeant Marx giving him the fishy eye. It looked as though he was destined to make his first spaceflight after all.

Camp MacGregor was one of those barbed wire, quonset hut and dust places that the Army keeps all over the country, and everybody forgets about until they are needed. It had been built during the Second World War and used infrequently ever since. The surrounding fence now had guards on it for the first time in twelve years.

After the buses had careened off down the dusty road through the middle of camp, the men picked up their bags, moving to their assigned bunks. Then it was back out to the "parade field" to be told that training would commence immediately.

Units were broken down into platoon strength and given training assignments. The first part of the training was to be classes by a crew of specially imported experts. The troops were under the tender care of the NCOs, as all of the officers had been pulled out for other instruction at a separate location. Then, for the next few days the classes came at them thick and fast. So heavy was the pace, names and topics began to blur and only individual scenes stood out in everyone's mind.

The dark, squat man with the glasses had introduced himself as the representative of North American, the company that made the HLTV. He told them that the HLTV was basically the same as their MICV, once it was modified for Lunar combat. "Other than a sealed nuclear engine, no real difference exists in these vehicles. Modification kits are on the way to the Moon, containing nylon armor for the vehicle body and fighting turrets to be mounted on the front. Those turrets are half laser-armed and half heavy-machine-gun in the same mix as you have in your units. The resulting vehicles will handle about the same as your old transportation, with a little more liveliness due to the light gravity."

A solid-looking black NCO stood up from the group of troops, "Sir, Sergeant First Class Sheffield. Just how effective is the armor of the modified HLTV? Is it as good as the aluminum plate that we have on our present tracks?"

The man had no hesitation in replying, "The two inches of nylon armor will stop or deflect just about any flying fragment. It will not stop any penetrators, but, then, neither will that of the MICV.

"Before you ask the next question, Sergeant, I think I can guess what it will be. Maintenance will not be the

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crew's responsibility, except for emergencies. You will be given training for those. The prime item which will concern you is the self-recovery capability of the vehicle.

"To that end, gentlemen, please notice that the HLTV has two winches, two hundred feet of cable and two terrain anchors mounted on the front, up here. In addition you will notice three pneumatic lifting plates mounted on the vehicle's bottom, in case of being stuck in Lunar dust."

The question came from the back, "How long would it take to get out of the dust, Sir, using those plates?"

The little man faced his audience once again, "At least five minutes. So you drivers had better stay clear of suspect terrain on the assault phase. Get stuck and you stand a good possibility of being hit by return fire. This nylon should stop your own fragmentation bombs, or any shrapnel, but will definitely not stop any beams."

Sergeant Marx stood up this time, "Why all this use of nylon, Sir? Wouldn't the use of aluminum be just as easy?"

"Sergeant, that depends on your purpose. The nylon plating that we will give you is nonconducting. We think that it will aid in keeping you from being detected and pinpointed. Also, we know for certain that one of the enemy weapons depends on conduction for its effects.

"Now, if all of you will come over here to the HLTV, we'll go over the interior."

The next major course of instruction was in the use and care of the Moonsuit that they would be using. They learned to put the thing on, to move in it, and to repair any major damage that the suit might sustain. "In fact, gentlemen, you will be wearing not only the suit itself, but your regular fabric armor and a suit of naugahide, specially reinforced, to protect against most wear and casual damage. If the suit is punctured, you will all carry patch kits sufficient to repair five fifteen-centimeter by twenty-five-centimeter holes in the suit fabric." Here the instructor stopped and looked at his audience. "If you get any more than that, look for a good friend or a chaplain." The last remark aroused some scattered, grim laughter.

The subjects continued, from first aid in vacuum to care of personal weapons on the Moon ("Remember to use only the proper lubricant, otherwise the alloy barrels will shatter when the weapons are fired." "Burroughs!" "Yes, Sergeant." "Oil your damn piece with the right lube, understand?" "Yes, Sergeant.") The officers were segregated at this time, undergoing an abbreviated version of the course the enlisted ranks were taking. The time thus gained was put into a detailed study of the alien installation and its defenses.

Special instructors for the officers ranged from former astronauts through intelligence specialists to theoretical scientists. These last were particularly impressed at the concentration displayed by the junior officers,

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particularly the way every major point they made triggered minor, whispered discussions, ("Charlie!" "Yeah, and not so loud, Bob." "I think Marian's a nice name, don't you?" "Huh?" "For my baby, dumb ass. If it's a girl, Judy and I are going to name her Marian.")

After three days, the battalion commander began to supplement the classes with field exercises. Using HLTVs, the troops went through training designed to get the best results under the expected Lunar conditions. The attitude was different on these exercises. The troops realized that they were going to do this thing for real, next. Soon, they would be in a situation where both the enemy and the environment were killers.

Arriving at Lunar Port, the battalion was ready to board ship for the Moon. Several days of additional training had been planned there to accustom them to vacuum working conditions and the light gravity. Vehicles had been sent ahead, and the only gear that they carried consisted of personal weapons and equipment.

A few incidents stood out in the bustle of loading. SGT Marx had to extract Samuels from the launch field ladies room where he was hiding. Lieutenant Bary and Sergeant Sheffield continually crisscrossed paths as they tried to assemble all forty of their independence-minded troopers in one place at one time. Lieutenant Colonel Kevy was seen in deep discussion with more stars than there appeared to be in the heavens overhead.

Finally, the battalion was shipped off to the Moon. This was a deceptively simple sounding operation that required all eight of the Lunar Shuttles and most of the available resources of NASA and the Air Force. One particularly agitated Brigadier General came close to having a stroke, and considerably closer to giving one to the civilian in charge of the launchings.

Even during the discomfort of blastoff, the troopers kept their high spirits and began to look on the whole operation as some kind of lark. The NCOs, however, did not. They had the responsibility for the various space-sick cases. Military chain of command took over, and PFC Garcia and PVT Samuels found themselves a detail of two, with orders to clean out a compartment of seven sick men. This was much to Garcia's disgust, as he was the unofficial ringleader among the lower rankers of the King Cobras. His solution was to exercise his command authority and his right arm, and put that good-for-nothing Samuels to work. This solution met with SFC Sheffield's approval and Samuels's intense dislike.

After arriving on the Moon, the battalion shook down into the training routine that they would follow for the next few days. The majority of the instruction was aimed at teaching the men to move in low gravity, and practicing vacuum maneuvers. The officers spent all of the time not in vacuum in the main briefing room of Moonbase. It was there that they were

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called after fifty hours on the Moon to what was termed a "major meeting."

Bob Bary had heard all the rumors of high brass coming up to give them their final briefings. He viewed the situation with the jaundiced eye and inborn cynicism of the experienced lieutenant. Said brass, he figured, would not only brief them, they would try to totally take over the show. It went with the nature of the beasts. At any rate, he figured as he watched Kevy's athletic bounce up to the stage, they would know soon.

"Men, I have something of major importance to announce," Kevy's whole manner was worried and grave. His beginning was so far outside custom for an officer call as to grab their whole attention. Every man leaned forward on his seat, as though trying to pluck the Battalion Commander's thoughts from the air.

Mike Kevy was not a man to mince words when something had to be said, a unique trait that endeared him to this officers. He made his next announcement baldly. "Gentlemen, the last Lunar Shuttle headed for Moonbase was destroyed by enemy fire about two hours ago. It now appears we are marooned here on Moonbase until the alien base has been neutralized."

He paused a moment, then acknowledged the raised hand of his Operations Officer, Major Beane. "Sir, do we know what the shuttle was carrying? Our final instructions were supposed to arrive about now. Were they on that ship?"

"Yes, Hal, the Shuttle was apparently carrying our final operations orders, since there was a deputation from the Joint Chiefs of Staff on board." Kevy smiled grimly at that. Apparently he had had the same suspicions every one else had been sharing. This operation was too rich a plum careerwise to allow it to go to the people that would normally do the job. It was LTC Kevy's feeling that there would have been Majors commanding squads as "this" battalion made its assault, had that shuttle arrived. "Gentlemen, we appear to be isolated. The survival of Moonbase, and all of us here on the Moon, depends on our success in the attack. Therefore, before the aliens can act further, we will proceed as planned and rehearsed. Moonbase Commander will have fresh intelligence runoffs from a Lunar Suborbiter in two hours, and I will finalize the operations order on that information.

"You may commence final inspections. If adequate intelligence can be gained from the Suborbiter, the battalion Operations Order will be given in exactly ten hours from hack—Hack!

"Are there any questions?"

There were none, the whole sensation was still too unreal.

In the two and a sizeable-fraction centuries of its existence, the Army had pretty well institutionalized the preparations for organized mayhem. The next nine hours were a hotbed of activity in Moonbase as those prepa-

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rations were accomplished. Inspections, checks, last minute maintenance, briefings for the troops and other such actions filled the time of all officers and NCOs. As the rawest buck sergeant or second lieutenant soon learned, this sort of living was ninety percent of a leader's real job. The added motivation of real action made all of the leadership extra careful in their detailed checks.

Bob Bary had been running both himself and his NCOs frantic, getting his platoon ready to make history in the next few hours. He was so busy, in fact, that the impact of the situation never really registered. In a quiet moment, his mind began to clear of immediate concerns and return to his pregnant wife, Judy, and their future family. He stared with unseeing eyes at his tracks, suspended in their cradles on the transport vehicles. He felt a little guilty at the fact that he had not told her where he was or what he was doing. No one in the battalion had, of course, but future fathers see things with a little more impact than every one else.

His best friend, Charlie Jackson, commander of the second platoon, interrupted his maudlin thoughts. "Bob, grab your stuff! They've moved the Operations order up, and the Old Man is screaming his head off for us! Come on, brother, let's git!"

Lieutenant Bary, leader of the King Cobras and future father, grabbed his notebook and got.

The Battalion Commander didn't really show any of the tension and neither, Bob realized, did anyone else in the room. The issuance of the operations order was a ritual, hallowed by tradition, a professional rite. They could have been discussing the end of the world, but no emotion would show. This part was straight out of the book of routine actions, no matter the location of the battle.

Mankind moving to battle is an old familiar story in the racial history, and very little new is ever added.

Lieutenant Colonel Kevy went swiftly over the friendly and enemy situations, and their mission. These parts were too well known to the officers in the room to merit more than passing mention. What they had come to hear was the commander's concept of the operation and everyone perked up when he came to that part of the order.

"Gentlemen, the S-3 will brief the Concept portion," said the Colonel, and sat down.

"Thank you, Sir," said Major Beane. He reached for his notes, map overlays, and a pointer, then began. "The battalion will attack along three main axes of advance, moving through the crater wall at these points, with the object of joining up at this portion of the base. Your objectives are those listed on the overlays now being passed out to the company commanders. Take a moment and examine them."

The pause that followed was punctuated by the crackle of map sheets, the rustle of overlays, and the scratch of pencils marking the tactical maps.

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Major Beane looked out over the room from his position on the podium and tried to compose a dramatic way to continue his briefing. As unit commanders began to look up from their maps once again, he gave the whole dramatic idea up as a bad scene. He went back to the same dry, pedantic style that had irritated junior officers for twelve of his fifteen years of service.

"Gentlemen, you have all had time to study the general layout of the plan. I will now fill in the details." He turned back to a marked large-scale map and began to use his pointer. "You will observe that A Company has been chosen to come through the crater gap first. At H-30 seconds, one minute the combined mortar sections of the battalion will fire a time-on-target barrage scheduled to impact on the base exactly at H hour. This will be the signal for A Company to cross the Line of Contact, here, on the crater edge. At this time, the mortars will continue to lay down a VT barrage that we hope will confuse the enemy—or BEMs, if you will." Major Beane waited expectantly for the laughter at his little joke to die down. The only man that laughed was the Assistant S-3.

"In any case," he felt somewhat miffed at the universally bad reception to his humorous sally, "you will observe that Bravo and Charlie companies will each begin their respective attacks at approximately thirty second intervals after Alpha's. Alpha will have as its objective the section of base from twelve o'clock to four o'clock, Bravo will take from four to eight, and Charlie will take from eight to twelve. Your projected breakthrough points, marked on your overlays, will be supported and softened up by heavy fire from the Direct Fire Platoon. We realize that the base has some sort of shielding screen to stop solid objects and beams, but we hope to overload it by heavy construction of fires. VT will also add to the load, and hopeful overload, of the screen. I needn't remind you of what will happen if that screen is not broken. DF Platoon Leader, plan your fires accordingly."

LTC Kevy chose to regard that as the end of the Concept portion, and stood up to continue and complete the rest of the order. "Gentlemen, I will have my command group with Alpha initially, then my plan is to join Bravo as soon as they reach the objective. There is no reason to believe that the BEMs have broken our codes, or even know of the existence of our battle nets, so we will use the current Signal Instructions. Gentlemen, our only medical support will be our organic medics. There will be no evacuation. We are going to win this one or die trying. There is no second option open if we do not perform our mission."

The only thing in Bob's mind shortly after that was that the Old Man had picked one hell of a note to close on. That sort of thing was good for the history books, and Bob had borrowed the terms and tone almost verbatim when he briefed the platoon. The only sour note in what he had considered a

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passively impressive performance was SFC Sheffield's snort when he had come to the portion of do or die. The sergeant was an old timer and he had probably heard plenty of ringing phrases before this. Nevertheless, he noticed, there *was* no evacuation annex to the operations plan. That thought was the first real inkling of just how important this thing really was.

The line of cruciform carriers and their attached tracks formed a weirdly gleaming row on the pad outside Moonbase. Private Samuels took one look and mentally consigned his soul to the spirit of his aged Grandfather, shot dead in a drug raid in Chicago. He was still looking for a way out of this mess.

SFC Sheffield had more than enough to do, making final checks on his men and equipment, to worry about the odd shape of his transportation. Absentmindedly, he missed the rumble of engines and the smell of diesel, both gone in the vacuum. If the Lieutenant came back and the platoon wasn't ready there would be hell to pay. Sheffield was too good an NCO not to feel responsible.

The battalion was finally loaded, due to a lot of legwork on the part of NCOs and officers, aided by the use of many and various terms of profanity. The soldiers settled down on the benches inside the tracks and began to contemplate the metal walls with the stoic fatalism of the mechanized trooper. Until they jumped out to close with the enemy, their entire world would be the bouncing metal box in which they rode. They would live or die with the track, depending on the driver and luck to keep them alive. There was nothing to do about it, so the feeling was simply to take advantage of the opportunity to relax.

The special sections, mounted on small Lunar Sleds, jumped off first to gain positions on the crater wall. The Scouts were already out. They had the double mission of marking the attack routes through the crater wall, and getting any last minute information that they could. The Direct Fire Platoon moved out to the crater rim to emplace their heavy lasers and missile weapons. The whole platoon was excited at the chance to finally fire their big guns and missiles in earnest. Only the senior NCOs knew that they would be taking fire as well as giving it. They were the only ones in the platoon that knew somebody would die out there, today. Each sergeant tried to make sure that it was not his men who became casualties.

As the battalion was dropped at the dismount point, the tracks were detached from their carriers, falling with deceptive silence to the soft Lunar surface. Some interesting words bounced around the helmets as successive squads were shaken by their HLTVs falling the short distance to the Lunar floor. None the worse for their short fall in the light gravity, the vehicles shook down into battle order.

The mortar sections massed over to one side, and set up to fire the specially prepared ammunition they had been

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provided. The firing charts for those rounds had caused many sleepless nights at several computer centers. The major problem was to avoid giving too much range to the normally short ranged mortars. The mortar sections were using charges that would give the weapons only about a two hundred meter range under Earth conditions. The problem was not so much hitting the target as trying to avoid sending the projectiles into orbit around the Moon.

The light gravity had caused the mortar gunner other problems as well. The normal method of fire was to let the round slide down the tube, to be set off by a fixed firing pin in the base. Under the light gravity, the rounds would never go off. Instead, the assistant gunners had been trained to throw the rounds down the mortar barrels, something they would never do normally.

Tension began to mount as the S-3 began to count a time hack from the Operations track. The steady drone of his voice began to grate on everyone's nerves as the time for the attack approached. Bob tried to avoid thinking about Judy and their approaching baby. He began to mentally compose what he would say when the historic moment approached and the platoon was given the go-ahead order. SFC Sheffield wondered how many of the tracks would make it to the objective. In a pensive moment, he also wondered what the BEMs looked like. Samuels just wanted to go AWOL again.

The radio began to crackle with the S-3's dry voice in their earphones. Time began to take on an unreal flashing effect, broken by the reality of the hack.

"Hack. Time is H-15 minutes."

The Battalion Sergeant Major wondered if his youngest boy was still doing all right in high school. The damn kid had been flunking History when he'd left home.

"Hack. Time is H-10 minutes."

Lieutenant Colonel Kevy absentmindedly reached to push up his sleeve and look at his watch. Then he remembered he was in a Moonsuit, with the watch strapped to a console on his wrist.

"Hack. Time is H-5 minutes."

PFC Carlos Rico-Garcia, Bob's track driver, was in his element. He was the best in the platoon and was happy, waiting to rush his track into another assault. He felt it was just like training. Carlos blessed the light gravity that gave his HLTV the agility of his old '78 Chevy, back home in Puerto Rico.

"Hack. Time is H-4 minutes."

Charlie Company commander was an old Hemingway fan. The writer had always advocated spitting to show he wasn't nervous, and that sounded like a good idea. He didn't realize his error until he watched his grand gesture trickle down the inside of his faceplate.

"Hack. Time is H-3 minutes."

Bob tuned into his squad nets to catch the chatter. The first squad leader was praying ("Hail, Mary, full of

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grace . . ."). The second squad leader had other things on his mind ("Man, how was I to know she had the clap. Everything looked all right."). Bob cut off his squad nets and turned his mind to other things.

"Hack. Time is H-2 minutes."

Private Joseph Wiggins wanted another joint. His squad sergeant wanted a bourbon.

"Hack. Time is H-1 minute, 30 seconds."

The mortars began to fire. The gunners on the direct fire weapons got their last look at their targets from the crater walls, then crouched down behind the sights of their weapons.

"Hack. Prepare to move. Time is H-1 minute."

As he felt the vibration of his engine revving higher, Bob began to get nervous. He gave up on the idea of any type of historical statement.

LTC Kevy followed the final seconds with both his eyes on his watch and his ears on the radio. The second hand seemed to crawl with the seeming slow motion of everything else on the Moon. Painfully, the hand crept around to the twelve mark and the Battalion Commander switched on his mike. "All Kilo Nine stations, this is Kilo Nine Alpha Six, move out. Repeat, move out."

His body swayed with the inevitable jerk, and he wondered why, after all these decades of mechanized combat vehicles, the US Army had yet to come up with one of the damn things that started smoothly.

The Sergeant Major began a low cursing inside his helmet.

Bob switched on his mike, and found himself at a loss for words. The situation had finally hit him, momentarily stunning his mental processes. Finally, he found his voice, "Hell, Bravo One stations, this is Bravo One Six. Follow Me. Out." He remembered his basic course. They told him that, if all else fails, quote the Infantry motto then go kick somebody's ass. Yes Sir, he almost giggled at the thought. All the Way.

Headquarters Six, Lieutenant Colonel Kevy's track, had pulled a little to one side and Mike Kevy was watching his battalion roar past through his periscope. Track after track barreled by, hell bent for leather for the crater gaps and the alien base. The dust of their passing and the flashing of the great speeding shapes touched a chord in the normally phlegmatic Kevy. He started yelling into his helmet, "Go you great big steel bastards, go!"

Even the Sergeant Major got caught up in the spreading madness and promptly outranked the gunner in the track's fighting turret. He was still cursing as he slipped behind the weapon's breech, grabbing the firing levers.

Inside the Yedza station, the duty officer was feeling the boredom that was part and parcel of these little, out of the way surveillance stations. One has no scope, he felt. One commits an error in a border skirmish and one is sentenced to ten cycles watching a

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group of barbarians that the *Highest* has, in his wisdom, labeled for restriction. True, they had lately seen some action. The repression plan, however, was still on schedule. Even the sole barbarian attack had been laughingly easy to destroy. It had not offered one even the excitement of a minor ambush of Rizz rear echelon troops.

Idly, he watched one of the scopes depicting yet another meteorite storm headed into the area of the station. It seemed to be curiously localized, he thought. It might even be worth reporting the phenomenon when he left duty. He had turned to order the operator to make a record of the storm when the first of the mortar rounds exploded, five meters over the station's screen.

The continuous detonations snapped him out of his lassitude. He hit the alarm with one hand, one eye glued to the overhead screen and the other flicking to study the load meter on the screen generators. They seemed to be holding for the moment, but moving toward overload state. He ordered extra power then reached for the button to alert the station commander. Incredible as it may seem, they were under some form of attack. The bomb explosions in themselves were harmless, but the flying fragments kicked up so much dust that exterior surveillance was nearly impossible. There was too much metal and dust flying around to get accurate readings on anything. His eyes continued to rove the control room, taking in everything, until his whole attention was captured by the number four screen.

The screen showed a real time, pictorial view of one of the gaps in the crater wall. For some reason, dust had not obscured the view at that moment. The craggy gap, with the smooth plain before it, was frozen like a snapshot in time. Then a boxlike object, suddenly recognized as some form of vehicle, burst into view in the gap, charging for the center of the crater. It hit the small ridge of what remained of the crater wall and sailed into space, almost two meters above the Moon's surface. It flew an incredible distance, tracks rolling madly, scattering surface fragments like gems from the track segments. It landed with smashing impact and continued on, no worse for its momentary flight.

The duty officer stared as though frozen as two more vehicles crashed through the gap, duplicating the flying charge of the first. The dust suddenly boiled over and obscured his view of the gap. He wondered what those incredible things were as he cursed the fact that his gunners were not already at their posts.

One after another, the battalion's tracks smashed through the crater gaps. Once through, they spread out into battle formations for the run into the target. The BEM gunners had their weapons functioning now, but the shock of the attack and the distractions of the barrage had their effects. BEM fire was scattered and confused at first, giving the battalion vital mom-

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ents to deploy. Radios crackled.

"Bravo stations, this is Bravo Six. Form echelon left."

"This is Bravo One Six, roger. Break. Bravo One stations, form wedge, Bravo One Two on my right, One Three on my left, One Four to follow. Out."

"This is Alpha Two Three. Watch out, fire coming from the left."

"Alpha Three Six. Move a little to the left, Three Two, watch out for that emplacement. Try—Mother of God!"

"This is Three Six, one of my tracks is hit!"

"This is Alpha Six. Move on, keep up!"

Racing through the dust of the bombardment, the drivers weren't entirely blind. They had rehearsed the attack using the HLTV inertial guidance system and had occasional glimpses of their surroundings through the boiling dust clouds. Chance clear spots let them see what was going to happen, or had happened, but, maddeningly, never the whole story.

"Oh hell! They blew a hole in us!"

"This is Charlie Six. Who said that? Are you operable?"

"Charlie Six, Charlie Two Two. Operable. Holed on both sides. One dead. Operable."

"Charlie Six. Keep up with—"

"Charlie Six, Charlie Six! This is Two Two. Charlie Two Six is hit. Just scattered him all over the place. I am now leading."

One of the HLTVs in Bravo Company swerved to avoid a small crater. Its right-hand track hit a small boulder, flipping the vehicle over on its side. A moment later, a BEM beam found it, shredding the vehicle and all of its occupants.

"Bravo Six, this is Bravo Three Six. Bravo Three Three is out."

"Roger."

The gunners on the vehicles were in operation, now. Specialist Fourth Class Ramon Many Thunders was the gunner in Bob's track, Bravo One One. Prior to moving out, he had painted his face in the traditional manner. Now, he was howling war cries and snatches of half-remembered Commanche medicine songs as he gloried in the heavy jumping of his machine gun. Like most of the other gunners, he couldn't see his target. He just wanted to shoot, to be fighting in this wild charge through the murk.

"Break-hit in the engine compartment!"

"This is Alpha Six. Who was that? Did anybody see who got hit?"

Another track had its side shredded by a near miss and flipped, tumbling in the soft soil. Some of the men inside were tossed huge distances in the light gravity.

"Madre de Dios, con—"

"This is Kilo Nine Alpha Six. Do not swerve or deviate. Keep moving. *Hit 'em hard, dammit.*"

"Oh my God! They're murdering us." The unidentified voice on the radio was almost weeping.

The Yedza duty officer was still in his

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position in the center of the control room. He was blind to the battle and raging about the fact. His main weapons could not fire unless his protective shield was dropped, and the need for their firepower was becoming imperative. He flipped one eye to the generator gauge, noting the impending overload, and made a crucial decision.

He ordered the screen dropped.

Throughout the assault, the heavy direct fire weapons had been firing at the station with little or no effect. Unshielded weapons emplacements in the station area had been neutralized with savage satisfaction by men that suspected that their fire on the main objective was otherwise ineffective. Hidden in the blinding dust and metal, the laser beams had sparkled harmlessly, only a few centimeters from the station. The missiles had done no better. The platoon had gotten no reports of its effectiveness, only the radio traffic of the assault companies, telling of desperate effort and death.

One of the missile gunners watched a heavy laser on his right dueling with a BEM beam weapon, sparkling in the dust. Finally, he began to fume at the whole situation. As he felt ready to explode, his section chief began to give orders, "Target. Right front. Enemy station. Preplanned target A3. One missile. Fire when ready."

He trained his sights on the enemy station, muttered a curse in his native Tagalog, and punched the firing switch. "Round on the way."

At the moment of release, the missile, dictated by the chances of war, had been aimed at a point on the outer wall of the control room. The missile impacted only a few seconds after the screen was dropped. The control room and all in it were destroyed in the warhead's detonation.

Suddenly, the station was no longer protected from any kind of fire. Heavy lasers began to punch holes where they hit. Missiles were tearing great gaps in the station's walls. The station began to lose air from bullet holes and fragment rips.

The battalion continued its blind charge through the dust of the bombardment. This time, though, the barrage was having its intended effect, that of disorganizing the enemy control and suppressing his fire. The men in the vehicles were protected but the Yedza no longer had the same degree of protection.

One Yedza gunner tried to aim his weapon at the indistinct, dark shapes in the murk, and was not having much success. He picked out one that he thought for a moment was stationary enough to fire at, then stopped. He suddenly realized that the thing was headed straight for him. As the track loomed larger and larger in his screen, he could only stare, frozen in fear and horror.

The driver in Charlie Three One was pushing his track as he had never driven one before. He felt alive, wild with the thrill of the charging vehicle. Suddenly, the dust ahead cleared and he was able to see the camouflaged bulk of the station, right in his path.

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He howled a rebel yell and pushed his accelerator down. That thing was right there, and he was damn well going right through it. His platoon leader, riding as track commander, was caught up in the insanity of the moment. He beat his hands on the track hatch, trying to make the thing go faster.

The careening track suddenly hit a dip and leaped into space, flying an impossible distance. The momentum of the assault carried the heavy vehicle right into the side of the station, caving in the light pressure wall. The gunner was still in his turret firing as a structural member tore it from the vehicle, cleaving the man in half.

Like a man in a frenzy, the platoon leader dodged into the passenger compartment of the vehicle, ignoring the crushed driver's compartment and the half-body on the floor. He slapped his hand on the emergency escape hatch button, blowing the back ramp clear of the vehicle. Then he ran outside, followed by the squad of men that had been riding inside. Relief at their safe arrival turned the men into fanatics, firing in all directions in the now airless chamber.

"Kilo Nine Stations, this is Charlie Three Six. I'm inside, no resistance as yet."

"Charlie Three Six, this is Kilo Nine Alpha Six. Hit 'em hard, we're coming in after you. Break. Lift and cease all direct fire on the station, lift VT barrage. Out."

As the dust slowly settled, the shape of the station could be made out. It had been like an old wagon wheel, but it now had breaks and gaping holes in that wheel shape. Interspersed over the station, tracks had stopped their wild charge. The back ramps were lowered and men were charging down them, leaping into blast holes made by the missiles.

Bob's track had made it safely, but he had no time for thanks as they dismounted and charged inside the station. His men spread out with well-drilled precision. He hit the platoon intercom switch. "Bravo One, advance by bounds, fire and maneuver. Bravo One Four, start making some holes for us. Come on, Cobras, let's go!"

Bob and the leading men jumped to one side as the platoon weapons squad began to blow the automatic pressure bulkheads with hand-held rockets. They waited as the air gushed out of the chamber, and charged through a huge gap.

The Yedza commander hadn't been in the control room when it had taken a hit. She had been en route. She immediately diverted to the Emergency Command Center, near the station center. The speed of the attack had left her personnel one jump behind, never to catch up. As she arrived at the Command Center, she learned that the station walls were breached. Her fighters were still climbing into pressure suits as the soldiers began to methodically blow the emergency pressure bulkheads with hand-held missiles. As soon as she had the report of all personnel suited, she ordered the station's remaining airtight compart-

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ments opened. From here on in, she thought, the fight would be more even.

Bob was inside with his platoon as they charged from compartment to compartment. He looked up in time to see the bulkhead in front of them withdrawn before it could be opened. Turning to give an order to the fire team leader next to him, he saw the man slowly fold up and come apart like a rag doll in a high wind. He knew that he should seek cover, that they were receiving fire, but he couldn't force himself to move. He just stood there staring as the body and its fragments settled quietly to the floor. Joltingly, his head was shaken and teeth ratted by a boot, squarely in the seat of his suit. As he hit the floor, he saw SFC Sheffield dive down on the other side of the corridor.

One compartment still had its pressure bulkheads in place, as the Yedza fighters inside planned their ambush. The bulkhead was blown and the Yedza got set to massacre the soldiers charging into their field of fire. They had never heard of the old Drill Sergeant's rule, "When opening strange doors, toss in a grenade first to insure a friendly reception." After the blast, the soldiers charged into a compartment where nothing lived.

"Bravo Six, this is Bravo One Six. Walls have begun to open up. Am receiving fire."

"Roger, Bravo One Six. Don't let them slow you down. Repeat, don't let them slow you down."

"Charlie Six, this is Charlie Three Six. Engaged with light weapons emplacement. Request help."

"Look out for the one on your left."

"Alpha Three Six, this is Alpha Three Two. Lost two men to that last bunch. Still moving."

"Get that damn machine gun over here!"

"Bravo Three Five, this is Bravo Three Six. Take over, I'm out of it now."

"Oh Lord, get a medic."

"Medic! Medic! Goddammit, Doc, help me!"

Specialist Fourth Class John Brio had been a medic for twenty-two months when they landed on the Moon. These men were the first real casualties that he had ever seen in his life. Now, like most of the other men, he was almost in a state of adrenalin shock. He went from man to man doing his job, his body responding to his rigid training. Deftly, he closed light wounds with the special kits that he had been given. The more serious wounded were immediately sealed into a plastic bag, the bag pressurized, and John's hands went into the built-in arm pockets to continue treatment. He went on all day like that. He moved from a man with no legs to one that had every vein in his neck exposed, and never realized that he was crying.

"Alpha Two Six, this is Alpha Six. What is your situation?"

"Six, this is Two Five. Two Six is dead. We're moving."

"Where the hell is that fire coming

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from? Anybody see the bastard?"

"Watch out! Pair of them on your right!"

"Everybody down!"

"First squad cover by fire, second squad, advance."

"Grenade coming though."

"Kilo Nine Alpha Six, this is Charlie Six. Have cleared our section of the outer ring. Moving inward."

Private Samuels had separated from the rest of his platoon and was wandering, looking for a way out of this nightmare. He could hear the fight progressing through the radio in his helmet. For a second, he forgot where he was and tried to run the way that he did on Earth. Bringing up uncontrollably against the station wall, he saw his weapon go spinning away out of a blast hole. The sight shocked him. He knew he'd catch hell from Sergeant Marx for that.

He turned around and began to move back toward where he had last seen the platoon, using the low glide that he'd been taught. He was desperate to get back to his friends now. All thoughts of escape were forgotten. He moved in a daze, only coming out of it as he tripped headlong over a pair of bodies on the floor. He looked quickly at the dead, his empty stomach turning over at the sight. Then he realized that the heavy laser that they had been carrying was undamaged. If he brought that back to Sergeant Marx, maybe he wouldn't get yelled at so much for the loss of his rifle.

Lifting and carrying the awkward piece easily in the light gravity, he skated down the passage toward the group of soldiers at its end. Disregarding the open passage on his left, he tried to get over to Sergeant Marx and tell him of the loss of his weapon and the new one that he'd found.

Suddenly, he felt a sharp pain in his leg. Looking down, he could see the hole burned through his suit where the edge of the beam had caught him. He almost fainted, then a hand came out of nowhere, slapping a gluey vacuum bandage over the wound and the hole in his suit. He looked up and saw Sergeant Marx, putting his first-aid kit back in his belt. Then Marx simply folded in on himself as the heatbeam burned clean through his waist.

Close to the edge, Samuels did what so many others had done in like circumstances. He reverted to the killing machine that he had been trained to be long ago. His legs propelled him toward the big BEM emplacement, as half-forgotten voices reminded him how to hold the laser, how to activate it, and how to use it in the manner taught by a thousand DIs.

From a branch of the Main Chamber, the Sergeant Major witnessed the man's charge across the open toward the last major BEM blockade in the station. The heavy laser was just what they had been praying for to open it up. Now they could end this thing. As he watched the soldier clear the emplacement of the enemy, the Sergeant Major swore that he, whoever he was, would get a Congressional out of this. By God, he would!

Suddenly, that was it.

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There was no fighting. There was nothing left to fight.

Orders to sweep the objectives and secure the station came automatically, though the officers had been caught as flat-footed as their men. Quickly, the battalion slipped into one more routine task. It may have been in an alien base on the Moon, but this was the old familiar drill.

Bob assembled his groggy men and moved them out to secure their sector of the station. When he had counted noses, it had become apparent that the King Cobras were no longer at full strength. A lot of men had died here today, and some of them were his. He had a deep feeling of loss.

He knew that the books all said that he was supposed to wonder at his survival, but, somehow, he couldn't summon the energy to be concerned. The only emotion that possessed him outside of total weariness was the empty feeling that some of his men had died. *His* men. He called orders over the intercom with a brisk voice that belied his emotions.

Sergeant First Class Sheffield had seen many platoon leaders in his time, and liked most of them. This boy that they had now, well, he needed a helping hand now and then. But, he sighed, he's going to be okay. There'd be time later for his own emotions. Right now, there was a job to do. He ignored the fact that he had found his son's body in the final attack in the main chamber.

Bob was listening to the intercom chatter when he found the first of the alien bodies. Looking at the bloated thing oozing dark fluid into the vacuum, he realized that he was looking at an overgrown Koala Bear. He shook his head, thinking that the TVT networks would have a field day with the Army once pictures of these big, lovable teddy bears were released. Oh well, he thought, another day, another seventy-five cents.

Thinking about teddy bears made Bob think about Judy and the baby. He realized with a slight shock that the baby was about due, and he might already be a father. Try as he might, he couldn't summon up any feeling. He was too emotionally drained. Idly, he wondered if the child was a boy or a girl.

Further Excerpt From the Lecture of Khan Ordvin

We have seen how the first battle of the Moon was a classic case of speed, shock action, and fire power against a static defense. Now, for our next class, I want you all to review the background of the second battle of the Moon, the Battle of Ceylon, and the Rizz Treaty of Alliance.

As I said earlier, speed, shock action, and firepower are the key principles. It would be interesting to ask a Yedza how such a militarily advanced civilization could ignore the major military axioms of the civilization that they were attempting to repress.

It is a pity that they are all extinct and we cannot do so.

Class dismissed. ■

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THE DISPOSAL OF NUCLEAR WASTE IN SPACE: will it ever be feasible?

One of the major arguments **against** *nuclear power is actually a major argument* **for** *spaceflight!*

MICHAEL A. McCOLLUM

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During 1976 a coalition of environmentalists mounted the most serious challenge to the nuclear power industry yet. Antinuclear propositions were placed on the ballot in seven states, including Arizona where I reside.

At the height of the election campaign, a friend invited me to a Sierra Club meeting where the antinuclear initiative would be discussed. I found myself the only proponent of nuclear power at the meeting, and was forced to take the side of the industry against charges that ran the gamut from substantive to ridiculous.

One of the environmentalists' chief concerns was the means by which nuclear waste would be stored in the future. Current plans call for storing it underground in geologically stable formations for upwards of a million years. How, they wondered, would it be possible to safely store hazardous waste materials for so long, ensuring that ground water would never seep into the depository and carry the nuclear materials into the biosphere?

The concern is a very real one. A million years is too long a time to be able to guarantee anything. Should the next sapient species that rules the planet Earth drill for oil in the wrong spot, they could be in for a big surprise.

Since I was on the other side of the debate, I tried to counter this fear by suggesting a solution that has been popular in science fiction for the last thirty years. "Hold the waste above ground for fifty years," I suggested, "and rocketry will have advanced to the point where we can dispose of our waste in space." To most of my audience, this was a new and radical idea. They were obviously not devotees of Asimov, Clarke, or Heinlein.

Saying we can do it is one thing, of course. Actually doing it is something else again. The question arises: Will waste disposal by rocket ship be possible in fifty years? A hundred? Ever?

Let's consider the problem.

The Orbital Mechanics of Waste
(Where do you park a radioactive garbage truck?)

The biggest obstacle to the disposal of nuclear waste products beyond the atmosphere is first hauling them up out of our planet's rather sizeable gravity well. After that is accomplished, the rest should be easy. Shouldn't it?

Let's attack the problem backwards. Pretend for a moment that we have a cheap, easy method of getting nuclear wastes into Earth orbit in some kind of a container. Unfortunately, they can't be left there. Orbits tend to decay long before nuclear waste does. Sooner or later the waste canisters will come crashing down on our heads. So we have a simple problem. Where can radioactive waste be sent that it won't come back to haunt us?

The number of waste disposal methods available to us are somewhat limited. They all involve boosting the waste canisters from Earth orbit to some final destination . . . somewhere *out there*. These methods fall into two general classes. We can either throw

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away the waste in space so that it will never return. Or else, we can drop it down a convenient hole somewhere, i.e., place it deep in the gravity field of some celestial body other than the Earth. Considering the possibilities, the following cases come immediately to mind:

Case I—Solar Impact

The Sun would appear to be the perfect place to dispose of nuclear waste. Massing some 2 x 10^{30} kilograms, the whole Earth could be dropped into the Sun without much of a splash. Unfortunately, the Sun is exceptionally hard to reach. To drop an object into the Sun we must shed most of the Earth's 18.5 mile per second orbital speed.

Case II—Solar System Escape

Increase the speed of a waste canister in close Earth orbit sufficiently, and it will fly right out of the solar system. The magic number is 26.2 miles per second which isn't all that much higher than the 18.5 mile per second orbital velocity that causes problems for the solar impact case.

Case III—Lunar Impact

The Moon possesses the closest gravity well suitable for dropping waste into. By boosting waste canisters to Earth escape velocity (6.85 miles per second), we could impact them onto the surface of the Moon.

Case IV—Lunar Landing

The previous three cases have one thing in common. All get rid of the waste more or less permanently. If future retrieval were contemplated, however, lunar landing might be attractive. Of course, any booster would have to carry enough additional fuel to retard its natural tendency to plunge into the lunar surface at 5000 miles an hour. More fuel will mean less payload, all other things being equal.

CASE V—Lagrangian Point Storage

There are two points in space where gravitational forces are such that an object appears to be motionless with respect to the Earth-Moon system. These are the stable Lagrangian points, each located at the third vertex of the equilateral triangles formed by the Earth-Moon system. (Of the five theoretical Lagrangian points, only these two are gravitationally stable.)

Nuclear waste canisters stored at the Lagrangian points would remain there forever, yet could be quickly retrieved should the occasion arise.

Figure 1 lists these various solutions to the problem of space disposal, giving the velocity increments necessary to propel the nuclear waste to a final destination for each case. As will be seen later, these differing incremental velocity (DELTA V) requirements have a major impact on the cost of waste disposal and its feasibility.

By consulting the DELTA V_2 column of Figure 1 and making a basic assumption concerning the performance of the rocket engine for our hypothetical space booster (specific

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FIGURE 1: ORBITAL AND ROCKET PARAMETERS FOR VARIOUS WASTE DISPOSAL MISSIONS

CASE	TYPE	DELTA V (Earth)[1] -mi/sec-	DELTA V (Orbit)[2] -mi/sec-	MASS RATIO
I	Solar Impact	16.7	11.86	71.8
II	Solar System Escape	7.7	2.86	2.80
III	Lunar Impact	6.85	2.01	2.06
IV	Lunar Landing	8.35	3.51	3.54
V	Lagrangian Point	6.85	2.01	2.06

DELTA V[1]
is the velocity change required with respect to the Earth's surface.

DELTA V[2]
is the velocity change required from an orbit 115 mile high (4.84 mi/sec orbital speed).

Equation: $\text{DELTA V} = \frac{g_o \, I_{sp} \, \ln (\text{M.R.})}{5280}$

I_{sp} = specific impulse = 455 seconds

g_o = acceleration of gravity at the Earth's surface = 32.2 feet per second^2

M.R. = $\frac{\text{fueled weight of rocket}}{\text{dry weight of rocket}}$

impulse is equal to the latest high pressure, liquid hydrogen engines); it is possible to calculate the required booster *Mass Ratio* (M.R.) to complete a specific mission.

Mass Ratio is simply the fueled weight of a rocket divided by the dry weight (payload and structure)—a measure of the amount of fuel that has to be expended to boost each pound of payload to the required velocity.

Getting Into Orbit

(Watch that first step, it's a killer.)

What about the first stage rocket that will lift the waste and second stage booster into orbit? Without a cheap, easy method of achieving orbit there will never be any chance of nuclear waste disposal in space. The first stage booster is the keystone of any viable space transportation system.

Luckily, we have the Space Shuttle.

The Space Shuttle is the first spaceship worthy of the name. About the size of a DC-9 aircraft strapped to a

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747 at launch, the Shuttle has a cargo bay fifteen feet in diameter and sixty feet long. It has the capability of lofting 65,000 pounds of payload into an equatorial orbit 115 miles high. And best of all, NASA will rent out the Shuttle for a mere $20 million a flight. Compared to the Saturn V, (excluding waste), and the amount of radiation shielding that will be carried by the Shuttle to protect the flight crew. NASA has kindly supplied us with the weight of an upper stage booster. The Interim Upper Stage (IUS) is being designed to boost communications satellities to synchronous

FIGURE 2: PAYLOAD AND COST PARAMETERS FOR VARIOUS WASTE DISPOSAL MISSIONS

CASE	TYPE	MASS: RATIO	PAYLOAD -pounds-	UNIT COST -$/pound-
I	Solar Impact	71.8	-4164	----
II	Solar System Escape	2.80	16,428	1370
III	Lunar Impact	2.06	24,126	932
IV	Lunar Landing	3.54	11,950	1883
V	Lagrangian Point	2.06	24,126	932

ASSUMPTIONS:
Cost of shuttle flight—$20 million
Cost of expendable booster—$2.5 million
Shuttle payload capacity to low Earth orbit—65,000 pounds
Radiation Shield weight—5000 pounds*
Booster and canister weight—5000 pounds#

$$\text{PAYLOAD} = \frac{65{,}000 - 5000^{*}}{\text{M.R.}} - 5000^{\#}$$

that's like getting a Rolls Royce at Volkswagen prices. The Shuttle achieves this cost breakthrough by being reusable.

It is this simple, logical idea which will open up a whole new era in spaceflight.

How much nuclear waste will the Shuttle carry on a single flight? To determine that, we need to know the dry weight of the second stage booster orbit. Its dry weight will be 3,577 pounds. For conservatism, let's assume our waste booster weighs 5000 pounds. And to make calculations simple, assume the Shuttle is loaded down with another 5000 pounds of shielding.

The results of our payload calculations are shown in Figure 2. However, this is only half the information needed. What will a flight cost?

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As noted previously, NASA charges $20 million per launch. This covers the cost of fuel, operations, and support services. Shuttle development costs are considered an investment in the future and will not be recovered. The only other cost involved in our Shuttle-Orbital Booster system is the cost of the expendable second-stage booster. A viable space transportation system will use a considerable number of boosters, leading to a significant reduction in hardware costs. A rocket designed to operate in the vacuum of space can be quite simple—fuel tanks, engine, guidance system. In fact, it would not be as complicated as the jet engines powering a modern jumbo jet. *Therefore, assume the expendable* booster will cost $2.5 million, the same as the most expensive commercial turbofan engine in use today.

Thus, the cost per pound of waste launched varies from $932 to $1883 for Cases II through V (see Figure 2).

As suspected, the solar impact mission (Case I) proves to be too much for the Shuttle and chemical rocket booster we have been discussing. However, a low thrust ion engine using the nuclear waste as a heat source would be another thing entirely. Ion engines have very high specific impulses compared to chemical rockets, and the mission mass ratio for solar impact would be dramatically reduced.

Such an ion engine could be available in ten years if it were needed.

So we now have our first practical piece of information. For a lunar soft landing, the cost would be $1883 per pound of waste. That's nearly what a pound of gold costs at today's prices.

Is our waste as precious as gold? How about silver?

To answer that question, we must leave the world of astronautics and enter the world of nuclear power.

FIGURE 3: THE TRANSFORMATION OF URANIUM FUEL INTO RADIOACTIVE WASTE IN A PALO VERDE CLASS REACTOR

I. INITIAL LOAD OF FUEL:	
URANIUM-238	96,035 kilograms
URANIUM-235	3,278 kilograms
TOTAL	99,313 kilograms
II. AFTER THREE YEARS OF OPERATION:	
URANIUM-238	93,652 kilograms
URANIUM-235	794 kilograms
URANIUM-236	457 kilograms
FISSION PRODUCTS	3,475 kilograms
PLUTONIUM	884 kilograms
NEPTUNIUM-237	35 kilograms
AMERICIUM-243	12 kilograms
CURIUM-244	4 kilograms
TOTAL	99,313 kilograms

The Economics of Nuclear Power Stations

(So that's why my electric bill has been so high lately!)

The Palo Verde Nuclear Generating Station is currently under construction at Wintersburg, Arizona (about forty miles west of Phoenix). When completed it will operate three independent pressurized water reactors (PWRs), each fueled with 99,313

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kilograms of enriched uranium, and capable of generating 1,270,000 kilowatts of electrical power.

Since it was the Palo Verde plant that sparked the meeting that led to this article, we will use it as our example.

When one of Palo Verde's three reactors first goes on line, it will contain some 96,035 kilograms of Uranium-238 and 3278 kilograms of fissionable Uranium-235.

After approximately three years of operation, the plant will have 'used up' this fuel and it will be replaced by new fuel. Besides the U-238 and U-235, the spent fuel will have something else in it. This something else is the nuclear waste. Waste comes in two varieties. When the U-235 fissions to produce energy it breaks down into a variety of lighter elements, called *fission products*. There are also a few elements heavier than uranium—*transuranics* formed by neutron capture in the U-238. The most famous transuranic is Plutonium.

Figure 3 shows what has happened to the fuel in three years of operation. Most of the fissionable U-235 has been used up and fission products have multiplied to the point where they interfere with the chain reaction. They have to be replaced with fresh fuel. After removal from the reactor, the depleted fuel rods are stored underwater in a holding pool to allow them to 'cool off'. Radioactivity in the spent fuel can be seventy times lower after a year of storage than at the time the fuel was removed from the reactor core. Following the cooling period, the fuel is shipped to a reprocessing plant where it is separated from the waste. The waste products are then solidified and prepared for disposal.

After three years of operation, a Palo Verde class reactor will have created some 4410 kilograms of waste products. This works out to a yearly waste production rate of 3252 pounds per reactor.

As a point of interest, consider the volume of this waste. Figure 4 lists the primary fission product constituents of nuclear waste. When processed into a solid, each metric ton of fuel (1000 kilograms) will yield approximately 0.04 cubic meters of waste. Thus, a Palo Verde class reactor will generate 1.32 cubic meters of waste in a year's operation.

That brings us to the final piece of information required before we can make a decision concerning the disposal of nuclear waste in space. What is the cost of operating a modern nuclear reactor?

Electric utilities figure their cost of generating power in mills per kilowatt-hour. Figure 5 compares the cost of generating electricity in nuclear power plants with the cost of more conventionally fueled plants. As can be seen, the cost of generating power at Palo Verde will be 38.3 mills (3.83¢) per kilowatt-hour. Assuming the plant is in operation 80% of the time (shutdowns are for maintenance, fuel reloading, etc.) the cost of operating each reactor for a year is $341 million. Note that this figure rep-

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FIGURE 4: FISSION PRODUCT CONSTITUENTS OF NUCLEAR WASTE

ISOTOPE	HALF-LIFE	DECAY PARTICLES AND INTENSITIES
Hydrogen-3*	12.26 years	Beta, 0.0181 Mev
Krypton-85*	10.4 years	Beta, 0.67 Mev; Gamma, 0.52 Mev
Strontium-89	50.4 days	Beta, 1.46 Mev
Strontium-90	28 years	Beta, 0.54 Mev
Yttrium-91	57.5 days	Beta, 1.55 Mev; Gamma, 1.21 Mev
Zirconium-95	65 days	Beta, 0.40, 0.36, 0.89 Mev; Gamma, 0.723, 0.757 Mev
Ruthenium-106	1.0 years	Beta, 0.04 Mev
Tellurium-129**	33 days (67.3 min.)	Beta, 1.45, 1.00 Mev; Gamma, 0.027, 0.47, 0.75, 1.10 Mev
Iodine-131	8.05 days	Beta, 0.61,0.25,0.81 Mev; Gamma, 0.354, others, Mev
Cesium-137	30 years	Beta, 0.52, 1.18 Mev; Gamma, 0.66 Mev
Cerium-144	285 days	Beta, 0.31, 0.19 Mev; Gamma, various
Promethium-147	2.5 years	Beta, 0.225, 0.10 Mev; Gamma, 0.121 Mev
Samarium-151	93 years	Beta, 0.076 Mev; Gamma, 0.021 Mev
Plutonium-238#	89 years	Alpha, 5.491 Mev; Gamma, various
Plutonium-239#	24,360 years	Alpha, 5.147 Mev; Gamma, various
Plutonium-240#	6580 years	Alpha, 5.159 Mev; Gamma, 0.047, 0.042 Mev
Plutonium-241#	13 years	Beta, 0.02 Mev; Alpha, 4.89, 4.85 Mev; Gamma, 0.100, 0.145 Mev
Americium-242#	458 years	Alpha, 5.482, 5.439, 5.386 Mev; Gamma, 0.060, 0.027-0.037 Mev
Curium-242#	163 days	Alpha, 6.110, 6.066, 5.967 Mev; Gamma, 0.044 Mev
Curium-244#	17.6 years	Alpha, 5.45, 5.36, 5.30 Mev; Gamma, 0.043, 0.100, 0.150 Mev

Notes: The most important isotopes in nuclear waste are Cesium-137, Strontium-90, Krypton-85, Plutonium, Hydrogen-3 in order of decreasing contribution to radioactivity.

* Gaseous element which will not be part of solid waste.

** Isotope that decays from one isomeric form to another, and thus has two half-life values.

\# Transuranic rather than fission product.

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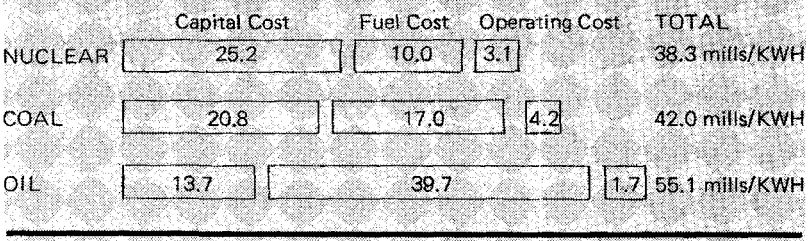
FIGURE 5: COST OF GENERATING POWER BY NUCLEAR, COAL, AND OIL FUELED GENERATING PLANTS



Figures published by the Atomic Industrial Forum, Inc; Public Affairs and Information Program; 7101 Wisconsin Avenue; Washington, D.C. 20014 in May of 1976.

resents only the cost of operating the reactor. Utility distribution costs, overhead, and profit must still be added.

Knowing the quantity of waste produced in a year and the income base which a utility has to support waste disposal, launching the waste into space begins to look very feasible indeed.

Before we jump off the deep end, however, it should be noted that there is one more all important facet of the problem to consider.

Safety Aspects of Waste Disposal

(Nothing can go wrong . . . go wrong . . . go wrong)

RADIOACTIVE is a word that should always be spelled in capital letters. It has a very highly negative emotional content. When an average citizen hears it, a switch closes in his mind. He stops thinking and starts running.

It is this built-in response, a legacy of Hiroshima, which must be countered if we are ever to build a viable waste disposal system based on the use of fallible rockets. Rigid safety standards must govern every aspect of waste disposal if we are ever to calm the public's fear of anything nuclear.

So let's make a few general rules for launching nuclear waste into space.

1. *Never launch over water.*

In the event of a Shuttle crash during launch, it will be vital for the waste canister to be undamaged and readily recoverable. Dropping it into water a mile deep doesn't help with the recovery problem. Should the canister leak waste materials, large areas of the ocean could be polluted.

Since the Shuttle will launch in an easterly direction to take advantage of the speed of the Earth's rotation, Cali-

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fornia is the logical location for the launch site. During the early phase of the launch (the time of greatest danger), the Shuttle will cross the barren deserts of the West. By the time it runs out of land, the Shuttle should be capable of aborting to orbit if anything goes wrong.

2. *The waste canister must withstand a crash landing intact.*

No matter how careful we are, a Shuttle will one day crash with a waste canister onboard. When it does there must be no tendency for small particles of radioactive materials to be spread by the wind. In studying nuclear waste disposal in space, NASA has designed a canister that can be dropped from orbit without rupture.

Such mechanical integrity can be enhanced by the use of parachute systems for emergencies. Should the Shuttle get into trouble during launch, the waste canister would be gently lowered to the ground to await retrieval. Loading the booster and waste into the cargo bay of the Shuttle upside down will also help. Being to the rear during a crash, the waste canister would have over a hundred feet of Shuttle to cushion the blow.

Finally, as a last ditch defense, the waste should be fabricated into a solid, cohesive form that resists pulverizing on impact. Current plans call for encapsulating it in glass. A lighter binding material should be found.

3. *Personnel must be protected from*

FIGURE 6: COST OF LAUNCHING WASTE FOR VARIOUS WASTE DISPOSAL MISSIONS COMPARED TO THE COST OF OPERATING A NUCLEAR REACTOR FOR THE PERIOD IN WHICH THE WASTE WAS PRODUCED

CASE	TYPE	PAYLOAD -pounds-	COST OF WASTE DISPOSAL PER REACTOR-YEAR -$-	PERCENTAGE OF REACTOR OPERATING COST -%-
I	Solar Impact	4164	———	———
II	Solar System Escape	16,428	4.45 million	1.03
III	Lunar Impact	24,126	3.03 million	0.89
IV	Lunar Landing	11,950	6.12 million	1.80
V	Lagrangian Point	24,126	3.03 million	0.89

Figures are based on a 1,270,000 kilowatt nuclear reactor with an 80% utilization factor and an operating cost of 38.3 mills per kilowatt-hour. Cost of Shuttle Flight—$20 million, expendable booster—$2.5 million

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radiation during all phases of the mission.

Whether transporting the waste from fuel reprocessing plants to the launch site, or loading it aboard the Space Shuttle, or offloading it in orbit prior to booster ignition—all human beings must be protected from the radiation inherent in nuclear waste. On the ground this shielding can take the form of massive concrete structures. Any shielding that flies, however, must be optimized for minimum weight. Here is where loading the cargo bay with the waste canister to the rear will help. The booster structure and fuel will shield the flight deck from radiation, reducing the need for fixed shielding aboard the Shuttle.

4. *Guide the waste to a geographically small area if the Moon is used for a waste disposal site.*

It would be negligent of us to allow waste rockets to bombard the Moon indiscriminately. Someday people are going to live there. We should not endanger their health by sowing the Moon with uncharted, radioactive land mines. Should we choose either lunar impact or lunar landing as a disposal method, the waste must be guided to a small area on the surface, and we must be able to leave records of where each waste canister came to rest.

So the question posed at the beginning of this article has been answered. Will it be possible to dispose of waste beyond the atmosphere in fifty years?

The answer is a resounding YES! But why wait? We have the technology to permanently rid ourselves of nuclear waste today. If we start work now, the first waste canister will be on its way in five years.

Each of the cases summarized in Figure 6 offer individual advantages (except Solar Impact, of course). Accelerating the waste to solar escape velocity is probably the simplest solution if the waste is merely to be thrown away. Lunar landing and Lagrangian point storage offer the benefits of future retrieval. Lunar impact offers a nearby disposal site deep in a planetary gravity well at minimum cost.

Let's look at a typical scenario of a waste disposal mission involving the lunar impact option:

The time is October, 1987. Palo Verde Reactor Number One is undergoing its yearly fuel reloading cycle. One-third of the fuel rods are removed from the reactor and placed in underwater storage. To make room for them, the fuel rods replaced the previous year are loaded into shielded shipping containers and shipped to a reprocessing plant. These fuel rods contain 33,000 kilograms of spent fuel and 3252 pounds of nuclear waste.

This waste is separated out of the depleted uranium fuel at the reprocessing plant and combined with the waste products of seven other reactors. These reactor wastes are then cast into a single large block, loaded aboard a shielded freight car, and shipped to the California launch facility. Total

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waste materials to be launched: 24,126 pounds.

At the launch facility the waste canister is mated with a booster in the cargo bay of a Shuttle ready for launch. This occurs at T minus 20 hours and counting.

At dawn the next day, after a twenty minute automated countdown, three massive rocket engines ignite and the Shuttle lifts ponderously into the air. It climbs quickly, gaining speed by the second, and turns eastward. It is quickly out of sight in the cloudless blue sky.

Twenty minutes later the Shuttle achieves orbit without incident. The flight crew relaxes while the mission specialist checks out the booster's guidance system, verifying all systems are operational. Then the pilot yaws the Shuttle into position as the mission specialist opens the cargo doors and jettisons the booster. Its job done, the Shuttle fires its engines and drops back toward *terra firma*. The crew will be home by lunch.

The booster is on its own now. It aligns itself toward an invisible window in space and patiently awaits a signal from the ground. A command flashes upward by radio and the rocket engine ignites, pushing the booster outward on its flight to the Moon. After a ten minute burn, the engine shuts down to coast the rest of the trip. All is quiet for two days while ground control analyzes the flight trajectory. At the end of the second day they send the command for a midcourse correction. The engine coughs briefly to life, changing the speed of the booster by a few feet per second. It is now on target for Waste Dump One. No further corrections are deemed necessary.

As the flight nears its end, ground control sends out a command to an automated station on the surface of the Moon. A high-powered laser flashes skyward as a beacon. The small television camera onboard the incoming rocket catches the flash, triggering the terminal guidance program into operation. Like a smart bomb, the booster adjusts its descent with tiny bursts of power from its thrusters. The canister is guided to its target, missing the automated beacon by less than a kilometer. The nose camera performs one last duty. It sends back pictures of the lunar surface right up to impact, allowing ground controllers to plot the canister's final position for future reference.

Finally the journey is over. The waste canister smashes into the lunar surface, the momentum of its 5000 mile per hour crash causing its specially designed nose cone to burrow several feet into the vacuum packed lunar soil. The soil is both a radiation shield and a barrier to migration of the waste.

Thirty days later the Arizona Nuclear Power Project which operates the Palo Verde plant receives a bill from NASA. The bill is for their share of the launch expenses. The comptroller looks at the payment notice and shakes his head in wonder. He signs an order to pay the $3.03 million bill out of petty cash.

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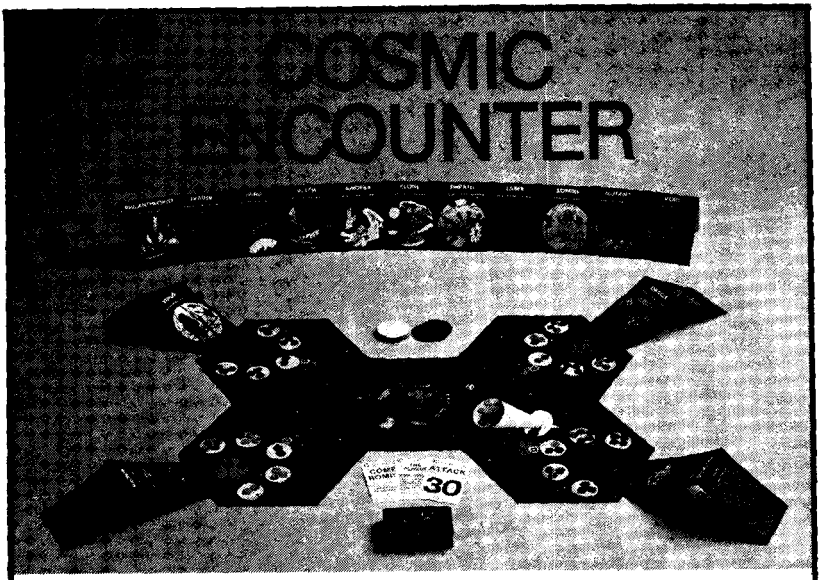

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After all, it represents less than 1% of the cost of generating power in the closing decades of the twentieth century. It is less than the Project will spend in a single year to convince a skeptical public that nuclear energy is safe.

So it turns out that space disposal is not only feasible, it is cheap! Compared to the scale of the nuclear industry, the rocket business is composed of pikers. Getting rid of the waste from nuclear power plants is still cheaper than installing a coal fired plant, and you don't have any smog problem.

So we can do it. But will we? That is a question every person must answer for himself. A viable waste transportation system will answer one of the few real objections to the full-scale development of nuclear power. No longer will men of good conscience be forced to burden future generations with our waste products. The toxic waste which our generation produces will be placed beyond the limits of our biosphere, eternally safe from the action of wind, waves, or groundwater. By placing our waste materials in space we ensure that any man who comes in contact with them will have the technological knowledge to handle them safetly.

We will be cleaning up our own garbage rather than willing it to our heirs.

But this is only the obvious, tangible benefit of such a system. The intangible benefits will be far-reaching indeed. Estimates of our nuclear capacity predict that by 1980 we will produce 300 metric tons of spent fuel each year. This fuel will contain 300,000 pounds of radioactive waste. To get rid of it we will have to launch a lunar impact or Lagrangian point mission once each month. This estimate includes only waste produced commercially in the United States. With the world going nuclear, we'd better make that two flights each month. Any excess capacity can be turned to reducing the huge pile of high level waste that our weapons program has accumulated over the years.

By the year 2000 we will be producing 21,000 metric tons of depleted fuel each year. This is 2.08 million pounds of waste. To get rid of the commercial waste will require a launch every four days. When the world and military are figured in, a launch every day except weekends is probable.

Obviously, launching five times a week is going to take a fleet of Space Shuttles. Not the four or five currently planned, but dozens. With this many spacecraft engaged in waste transport, we will have a high volume, profitable base on which to build a real space capability. It will be the first real step in expanding our tenuous toehold in space into a real beachhead.

For a thousand years men have dreamed of gaining access to the unlimited universe, and have searched for the key that would unlock the door to space.

How were they to know that key was slightly radioactive? ■

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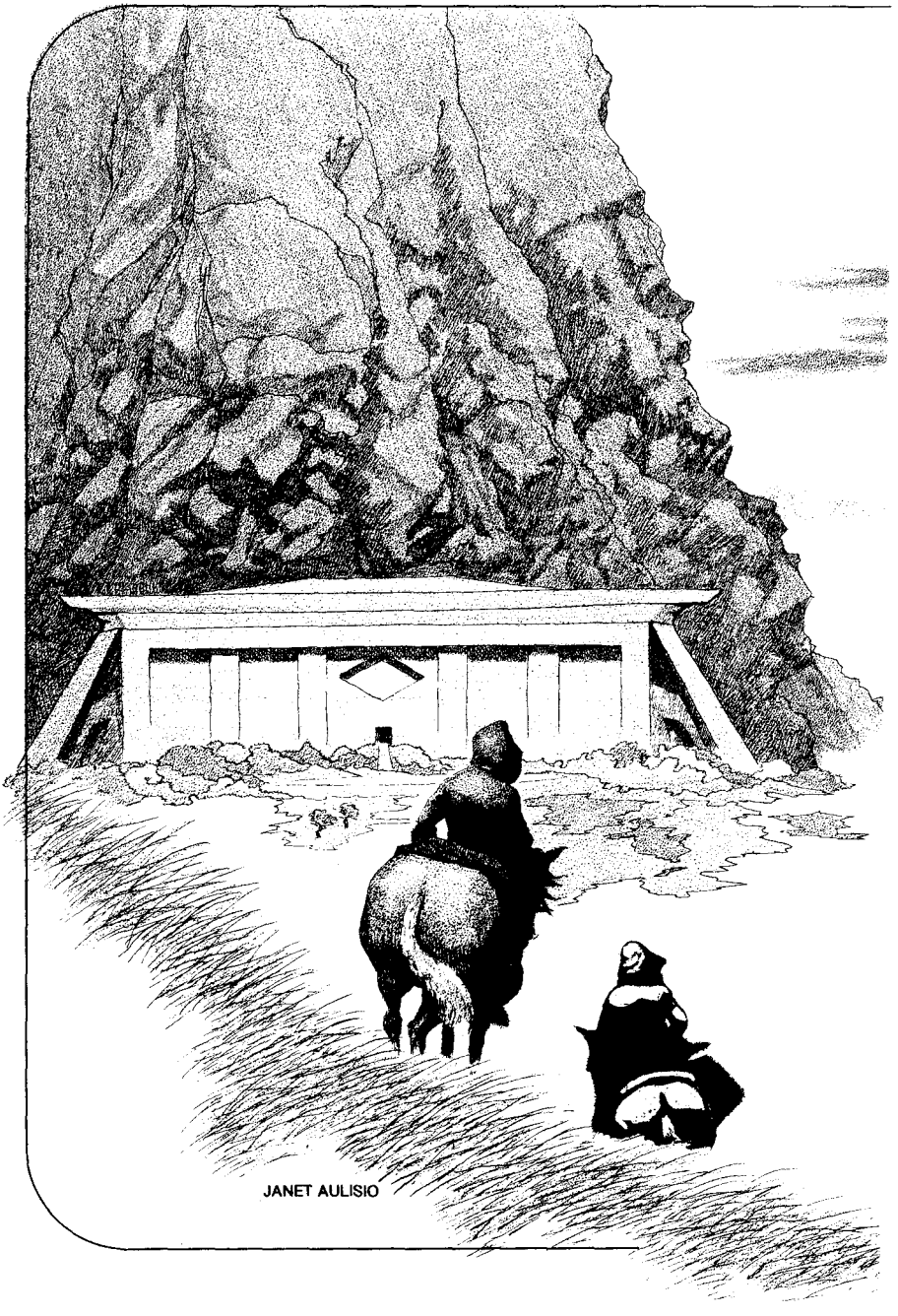

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THE BROKEN DOME

VONDA N. MCINTYRE

When a culture becomes very stable, it takes a calamity to make it change.

At home in the healers' station, Snake did not think of Center from one month to the next. But in the desert, among the caravannaires, life revolved around the city. Snake had begun to feel that her life too depended on it when at last the high, truncated mountain that protected it suddenly appeared, at dawn, before her. The sun rose directly behind the huge dark shape, outlining it in scarlet like an idol and turning the surrounding black sand iridescent.

Scenting water, sensing an end to their long journey across the eastern desert, the two horses raised their heads and quickened their tired pace. As the sun rose higher, the low thickening clouds spread the light into a red wash that covered the horizon. The storms of winter were all too close.

Melissa, Snake's adopted daughter, awoke from her half-doze when Squirrel, the tiger-striped pony, broke into a jog. She gazed sleepily around them, and stared up at the mountain as its sunrise shadow enveloped them.

"I didn't believe it was so big," she said.

"Neither did I," Snake said.

There was a wide dark pool at Center's base, but no streams flowed into it, and none flowed away. A spring must feed it, Snake thought, from underwater, and then the water creeps out into the sand. At water's edge, the ground cover of grass and low bushes grew lushly, but the summertrees had withered into rustling stalks. The wind whispered between the dry leaves and over the sand,

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coming first from one direction, then another, in the manner of winds near a solitary mountain.

Snake stopped when they reached the pool and Melissa halted beside her. Dismounting, Snake handed Slate's reins to Melissa.

"Follow me when they're finished drinking. I won't go in without you so don't worry. If the wind rises, though, come running. Okay?"

Melissa nodded. "A storm couldn't come that quick, could it?" The child's voice revealed the concern that her terribly scarred face could not show.

"I'm afraid it could," Snake said.

She drank quickly and splashed water on her face. Wiping the drops on the corner of her headcloth she strode up the smooth ramp to a tall, narrow alcove sheltering the city's entrance. She stopped before the steel gate. Generations of sandstorms had brushed the metal to a lustrous finish. But it had no handle, no bell-pull, no door knocker, no way Snake could see of summoning someone to let her in. She stepped forward, raised her fist, and banged it against the metal wall. The solid thud sounded not at all hollow. She pounded on the door again. As her eyes grew more accustomed to the dim light in the recess, she saw that the wind-polished surface was actually concave, perceptibly worn down by the fury of the storms.

Her hand aching, she stepped back.

"About time you stopped that noise."

Snake jumped at the voice and turned toward it. A panel clicked away into the side of the alcove and a window appeared. A pale man with bushy red hair glared out at her.

"What do you mean, beating on the door after we've closed?"

"I want to come in," Snake said.

"You're not a city dweller."

"No. My name is Snake. I'm a healer."

He threw back his head and laughed. Frowning, Snake waited until he stopped.

"So they've quit sending old crocks to beg, have they? It's young ones now!" He laughed again. "I'd think they could choose somebody handsome."

From his tone, Snake assumed she had been insulted. She shrugged. "Open the gate."

He stopped laughing. "We don't let outsiders in."

"I've brought a message from a friend to her family. I want to deliver it."

He did not answer for a moment, glancing down. "All the people who went out came back in this year."

"She left a long time ago."

"You don't know much about this city if you expect me to find you some crazy's family."

"I know nothing about your city. But she told me her people were related to the keepers of the gate. And I can see it—the hair, the forehead . . . the eyes are different, though. Hers are brown." This city-dweller's eyes were pale green.

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The young man scowled. "Did she happen to mention," he said, attempting sarcasm, "just exactly which family she's supposed to belong to?"

"The ruling one."

His scowl deepened. He glanced down and his hands moved, out of Snake's view. After several minutes he looked up slowly, one eyebrow arched in astonishment. "Wait there." His face dissolved in multicolored lines, and Snake realized she had been speaking to an image.

Nothing happened for some time. Snake leaned outside the shallow alcove and looked around.

"Melissa!"

There was no answer. The false window had turned dead black, and Snake was about to leave it to find her daughter when it wavered back to life.

"Where are you?" a new voice called. "Come back here."

Snake glanced outside one last time and returned reluctantly to the image-carrier.

"You upset my cousin rather badly," the image said.

Snake stared at the panel, speechless, for the speaker was astonishingly like Jesse, much more so than the younger man. This was Jesse's twin, or her family was highly inbred. As the figure spoke again the thought passed through Snake's mind that inbreeding was a useful way of concentrating and setting desired traits, if the experimenter were prepared for spectacular failures among the results. Snake was unprepared for the implied acceptance of spectacular failures in human births.

"Hello? Is this working?"

The red-haired figure peered out at her worriedly, and a loud hollow scratching noise followed the voice. The voice: Jesse's had been pleasant and low, but not this low. Snake realized she was speaking to a man, not a woman as she had thought from the resemblance. Not Jesse's twin, then, certainly. Snake wondered if the city people cloned human beings. If they did it often and could even handle cross-sex clones, perhaps they had methods that would be more successful than those the healers used in making new dreamsnakes.

"I can hear you, if that's what you mean," Snake said.

"Good. What do you want? It must be worrisome from the look on Richard's face."

"I have a message for you if you're direct kin of the prospector Jesse," Snake said.

The man's pink cheeks whitened abruptly. "Jesse?" He shook his head, then regained his composure. "Has she changed that much in all these years, or do I look like anything but direct kin?"

"No," Snake said. "You look like kin."

"She's my older sister," he said. "And now I suppose she wants to come back and be the eldest again, while I'm to go back to being nothing but a younger?"

The bitterness of his voice was like a betrayal; Snake felt it like a shock.

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The news of Jesse's death would not bring sorrow to her brother, only joy.

"She's coming back, isn't she?" he said. "She knows the council would put her back at the head of our family. Damn her! I might as well not have existed for the last twenty years."

Snake listened to him, her throat tightening with grief. Despite the brother's resentment, if Snake had been able to keep Jesse alive, her people *would* have taken her back, welcomed her back: if they could, they would have healed her.

Snake spoke with some difficulty. "This council—perhaps I should give the message to them." She wanted to speak to someone who cared, someone who had loved Jesse, not to someone who would laugh and thank her for her failure.

"This is family business, not a matter for the council. You should give Jesse's message to me."

"I would prefer speaking to you face to face."

"I'm sure you would," he said. "But that's impossible. My cousins have a policy against letting in outsiders—"

"Surely, in this case—"

"—and besides, I couldn't even if I wanted to. The gate's locked till spring."

"I don't believe you."

"It's true."

"Jesse would have warned me."

He snorted. "She never believed it. She left when she was a child, and children never really believe. They play at staying out till the last minute, pretending they might get locked out. So sometimes we lose one who tests the rules too far."

"She stopped believing almost everything you say." Anger tightened Snake's voice.

Jesse's brother glanced away, intently watching something else for a moment. He looked at Snake again. "Well, I hope you believe what I tell you now. A storm's gathering, so I suggest you give me the message and leave yourself time to find shelter."

Even if he was lying to her, he was not going to let her inside. Snake no longer even hoped for that.

"Her message is this," Snake said. "She was happy out here. She wants you to stop lying to your children about what it's like outside your city."

Jesse's brother stared at Snake, waiting, then suddenly smiled and laughed once, quickly and sharply. "That's all? You mean she isn't coming back?"

"She cannot come back," Snake said. "She's dead."

A strange and eerie mixture of relief and sorrow passed over the face that was so like Jesse's.

"Dead?" he said softly.

"I could not save her. She broke her back—"

"I never wished her dead." He drew in a long breath, then let it out slowly. "Broke her back . . . a quick death, then. Better than some."

"She did not die when she broke her back. Her partners and I were going to bring her home, because you could heal her."

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"Perhaps we could have," he said. "How did she die?"

"She prospected in the war craters. She couldn't believe the truth that they are dangerous, because you told her so many lies. She died of radiation poisoning."

He flinched.

"I'm sorry to give you pain," Snake said. "But I was with her. I did what I could, but I have no dreamsnake. I could not help her die."

He seemed to be staring at Snake, through her.

"We are in your debt, healer," he said. "For service to a family member, for bringing us news of her death." He spoke in a distressed distracted tone, then suddenly looked up glaring at her. "I don't like my family to be in debt. There's a payment slot at the base of the screen. The money—"

"I want no money," Snake said.

"I can't let you in!" he cried.

"I accept that."

"Then what do you want?" He shook his head quickly. "Of course. Dreamsnakes. Why don't you believe we have none? I can't discharge our debt with dreamsnakes—and I'm not willing to exchange my debt to you for a debt to the offworlders. The offworlders—" He stopped, upset.

"If the offworlders can help me, let me speak to them."

"Even if I could, they'd refuse you."

"If they're human, they'll listen to me."

"There's—some question about their humanity," Jesse's brother said. "Who can tell, without tests? You don't understand, healer. You've never met them. They're dangerous and unpredictable."

"Let me *try*." Snake held out her hands, palms up, a quick, beseeching gesture, trying to make him understand her. "Other people die as Jesse died, in agony, because there aren't enough healers. There aren't enough dreamsnakes. I want to talk to the offworlders."

"Let me pay you now, healer," Jesse's brother said sadly, and Snake might as well have been back at Mountainside. "The power in Center is precariously balanced. The council would never permit an outsider to deal with the offworlders. The tensions are too great, and we won't chance altering them. I'm sorry my sister died in pain, but what you ask would risk too many more lives."

"How can that be true?" Snake said. "A simple meeting, a single question—"

"You can't understand, I told you that. One has to grow up here and deal with the forces here. I've spent my life learning."

"I think you have spent your life learning how to explain away your obligations," Snake said angrily.

"That's a lie!" Jesse's brother was enraged. "I would give you anything I had it in my power to give, but you demand impossibilities. I can't help you find new dreamsnakes."

"Wait," Snake said suddenly. "Maybe you can help us in another way."

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Jesse's brother sighed and looked away. "I've no time for plots and schemes," he said. "And neither do you. The storm is coming, healer."

Snake glanced over her shoulder. Melissa was still nowhere to be seen. In the distance the clouds hugged the horizon and eddies and flurries of windblown sand skittered back and forth between earth and sky. It was growing colder, but it was for other reasons that she shivered. The stakes were too high to give up now. She felt sure that if she could just get inside the city, she could seek out the offworlders by herself. She turned back to Jesse's brother.

"Let me come inside, in the spring. You have techniques our technology isn't advanced enough to let us discover." Suddenly, Snake smiled. Jesse was beyond help, but others were not. Melissa was not. "If you could teach me how to induce regeneration—" She was astonished at herself that she had not thought of the possibility before. She had been completely and selfishly concerned with dreamsnakes, with her own prestige and honor. But so many people would benefit if the healers knew how to regenerate muscle and nerves . . . but first she would learn how to regenerate skin so her daughter could live unscarred. Snake watched Jesse's brother and found to her joy that his expression was relieved.

"That is possible," he said. "Yes. I'll discuss that with the council. I'll speak for you."

"Thank you," Snake said. She could hardly believe that finally, *finally*, the city people were acceding to the request of a healer. "This will help us more than you know. If we can improve our techniques we won't have to worry about getting new dreamsnakes—we'll be better at cloning them."

Jesse's brother had begun to frown. Snake stopped, confused by the abrupt change.

"You'll have the gratitude of the healers," Snake said quickly, not knowing what she had said wrong, so not knowing how to repair it. "And of all the people we serve."

"Cloning!' Jesse's brother said. "Why do you think we'd help you with cloning?"

"I thought you and Jesse—" She caught herself, thinking that would upset him even more. "I merely assumed, with your advanced—"

"You're talking about genetic manipulation!" Jesse's brother looked ill. "Turning our knowledge to making monsters!"

"What?" Snake asked, astonished.

"Genetic manipulation—Gods, we have enough trouble with mutation without inducing it deliberately! You're lucky I couldn't let you in, healer. I'd have to denounce you. You'd spend your life in exile with the rest of the freaks."

Snake stared at the screen as he changed from rational acquaintance to accuser. If he was not a clone with Jesse, then his family was so highly inbred that deformities were inevitable without genetic manipulation.

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Yet what he was saying was that the city people refused themselves that method of helping themselves.

"I won't have my family indebted to a freak," he said without looking at her, doing someting with his hands. Coins clattered into the payment slot beneath the screen. "Take your money and go!"

"People out here die because of the information you hoard!" she shouted. "You help the drivers enslave people with your crystal rings, but you won't help cure people who are crippled and scarred!"

Jesse's brother started forward in a rage. "Healer—" He stopped, looking beyond Snake. His expression changed to horror. "How dare you come here with a changeling? Do they exile the mother as well as the offspring out there? And you lecture me on humanity!"

"What are you talking about?"

"You want regeneration, and you don't even know you can't reform mutants! They come out the same." He laughed bitterly, hysterically. "Go back where you came from, healer. There can be no words between us."

Just as his image began to fade, Snake scooped up the coins and flung them at him. They clattered against the screen, and one jammed in the protective panel as it clicked up almost closed. Gears whined, giving Snake a certain unpleasant satisfaction.

Snake turned away from the screen and the city and came face to face with Melissa, who stood with the horses in the entrance to the city, tears streaming down her cheeks. She grabbed Snake's hand and blindly half-dragged her outside.

"Melissa, we've got to try to set up a shelter—" Snake tried to pull back toward the alcove. The sky was nearly dark, though it was morning. The clouds were no longer gray but black, and Snake could see two separate whirlwinds.

"I found a place." The words came hard; the child was still crying. "I—I hoped they'd let you in but I was afraid they wouldn't, so I went looking."

Snake followed her, half-blinded by the windblown sand. Slate and Squirrel came unwillingly, heads down and ears flattened. Melissa took them to a low fissure in the abrupt cliff of the mountain's flank. The wind rose by the moment, howling and moaning, flinging sand against their faces. Eyes streaming, Snake led the mare after Squirrel into the cave.

The wind died abruptly. Snake could hardly open her eyes, and she felt as if sand had been driven into her lungs. The horses snorted and blew while Snake and Melissa coughed and tried to blink the overwhelming sand away, brush it from their hair and clothes, spit it out. Finally Snake managed to rub or brush or cough away the worst of the scratchy particles, and tears washed her eyes clean.

Her back to Snake, Melissa soothed the tiger-pony.

"Melissa?" Snake said.

"It's my fault," she cried. With a sob she flung her arms around Squir-

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rel's neck. "He saw me and he sent you away."

"The gate was locked," Snake said. "He couldn't let us in if he wanted to."

"But they don't want you to come back. Because of me."

"Melissa, he'd already decided not to help us. Believe me. What I asked him for scared him. They don't understand us."

"But I heard him. I saw him looking at me. You asked for help for . . . for me, and he said go away."

Snake wished Melissa had not heard that part of the conversation, for she had not wanted her to hope for what might never happen. "He didn't know you'd been burned," Snake said. "And he didn't care. He was looking for excuses to get rid of me."

Unconvinced, Melissa blankly stroked the pony.

"If this is anybody's fault," Snake said, "it's mine. I'm the one who brought us here—" The full impact of their situation hit her as violently as the storm winds. The faint blue glow of the bioluminescent lantern barely illuminated the cave in which they were trapped. Snake's voice broke in fear and frustration. "I'm the one who brought us here, and now we're locked outside—"

Melissa turned from Squirrel and took Snake's hand. "Snake—Snake, I knew what could happen. You didn't make me follow you. I knew how sneaky and mean all these people here can be. Everybody who trades with them says so." She hugged Snake, comforting her as Snake had comforted Melissa only a moment before, only a few days before. She no longer kept her face turned away to hide the heavy ridged scars that stiffened the side of her face and held her left eye half-closed. Appreciating the trust and the reassurance, Snake embraced her too. But reassurance would not save their lives. They had little food or water; they could not live out the winter here in this narrow crack in the rock.

Was it merely a crack, though, or a real cave, a tunnel? The fissure extended beyond the limits of the lantern's light. Perhaps it reached much farther; perhaps the spring that fed the oasis outside had a twin in here. Or perhaps tunnels even led to the city.

"Snake," Melissa said suddenly, "do you hear something?"

Snake looked up and around, her fingers closing uneasily around the handle of her knife. "No, what?"

The light glinted across Melissa's red hair as she spun around. "The wind's stopped!" She ran toward the entrance.

Snake followed close behind, at every instant ready to pull Melissa back from the storm. But her daughter was right: what she had heard was not a sound but the abrupt end of a sound they had become accustomed to.

Outside, the air was absolutely still. The low dustclouds had swept across the desert and disappeared, leaving puffy, towering thunderheads arrayed around with rich blue sky. Snake stepped out into the strange luminosity of

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the morning, and a cold breeze fluttered the robe at her ankles.

All at once, the rain began.

Snake ran out into the drops, lifting her arms to them like a child. Squirrel trotted past her and broke into a gallop. Slate sped by him, and they cavorted and bucked like foals. Melissa stood still, gazing upward into the rain.

A triple rainbow arched across the sky. Snake sighed and sank down on her heels to watch it. She was so wrapped in awe of the colors alternating through the spectrum that she did not notice exactly when Melissa sat beside her. First she was not there, then she was, and Snake slipped her arm around her daughter's shoulders. Melissa relaxed against her, not quite so poised to tear herself away from any human contact, not quite so ready to expect pain.

The clouds passed, the rainbow faded, and Squirrel trotted back to Snake, so wet that the texture of his stripes, as well as their color, was visible. Snake scratched him behind the ears and under the jaw; then, for the first time in perhaps half an hour, she looked out across the desert.

In the direction from which the clouds had come, a pale, delicate green already softened the low black hills. The desert plants grew so quickly that Snake imagined she could see the boundary slipping nearer like a gentle tide, following the progress of the rain.

Snake left Center reluctantly. Melissa's cave *did* lead farther into the mountain. But there was no assurance that the tunnels led to Center, or to anything at all. The rain had given Snake a single reprieve for herself and her daughter; she did not dare refuse it. Still, somehow it did not seem right that the return to the mountains was as easy as a pleasurable trip through meadowlands. For that was what the desert metamorphosed into after a rain. The desert plants were full-grown by the evening of the first day, the day of the rain; by morning of the second day they had budded, and by afternoon flowers covered the dunes in drifts of color, one hill white, the next bright purple, a third multicolored in streamers of species that led from crest to valley. The flowers even moderated the heat, and the sky was clearer than Snake had ever seen it. She and Melissa rode by day, and the aurora borealis danced by night. The horses snatched mouthfuls of tender leaves as they walked, while their riders picked great bouquets of honeycups and sucked out the nectar. Pollen hung heavy in the air.

The third morning the dust clouds began to gather again. The rain had all seeped away or evaporated; the plants had captured all they could. Now dryness mottled the leaves with brown as the plants shriveled and died. Their seeds drifted across Snake's path in eddies of the wind.

The vast desert's peace wrapped itself around Snake's shoulders, but the foothills of the central mountain range rose before her, reminding her

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again of failure. She had gone to the city for Jesse, for Melissa, for the healers, but most of all for herself, and she had failed in every way. She did not want to go home.

Slate, responding to some unconscious movement of Snake's body, her reluctance to go on, stopped abruptly. Snake did not urge her forward. A few paces farther along, Melissa reined in and looked back.

"Snake?"

"Oh, Melissa, what am I taking you to?"

"We're going home," Melissa said, trying to soothe her.

"I might not even have a home anymore."

"They won't send you away. They couldn't."

Snake wiped tears fiercely away on her sleeve. Hopelessness and frustration would give her no comfort and no relief. She leaned down against Slate's neck, clenching her fingers in the mare's long black mane.

"You said it was your home, you said they were all your family. So how could they send you away?"

"They wouldn't," Snake whispered. "But if they said I couldn't be a healer, how could I stay?"

Melissa reached up and patted her awkwardly. "It'll be all right. I know it will. How can I make you not be so sad?"

Snake let out her breath in a long sigh. She looked up. Melissa gazed at her steadily, never flinching. Snake turned and kissed Melissa's hand; she enfolded it in her own.

"You trust me," she said. "And maybe that's what I need right now."

By the end of the day the tiny plants fell to dust beneath the horses' hooves. A fine brown haze covered the desert. Now and again a cloud of feathery seeds drifted by, cast to the air. When the wind was stronger, heavier seeds skittered along the sand like tides. As twilight approached, Snake and Melissa had already entered the foothills, and the desert had turned bare and black behind them.

At the first crest, before they started downward toward the next, higher, tier of hills, Melissa reined Squirrel in and turned around, gazing back at the darkening desert. After a moment she grinned at Snake.

"We made it," she said.

Snake smiled slowly in return. "So we did."

As they moved on, Snake kept a lookout for a place to camp. Before the horses descended very far she heard the welcome trickle of running water. The trail led past a small hollow, the source of a spring, a spot that looked like it had been used as a campsite long ago. The water sustained a few scrubby bushes and some grass for the horses. In the center of a bare-beaten patch of ground the earth was smudged with charcoal.

Night travel in the mountains was as difficult as day travel in the desert, and the easy return from the city had not wiped out the strain of the complete journey. Snake dismounted. They would stop for the night, and at sunrise—

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At sunrise, what? She had been in a hurry for so many days, rushing against sickness or death or the implacable sands, that she had to stop and make herself realize that she had no reason for hurrying any more, no overwhelming need to get from here to anywhere else, nor to sleep a few hours and rise yawning at sunrise or sunset. Her home awaited her, and she was not at all sure it would still be her home once she reached it. She had nothing to take back but failure and bad news and one violent-tempered wild sand viper that might or might not be useful. She untied the serpent case and laid it gently on the ground.

When the horses were rubbed down, Melissa went to look for scraps of wood or some dead bushes for a campfire, and Snake took the waterskin and walked upstream. Near the source of the spring she climbed to the top of a tremendous boulder that provided a view of most of the surrounding area. No one else was in sight, no horses, no camps, no smoke. Snake was finally almost willing to let herself believe that the crazy who had ransacked her camp on the western desert and attacked her in the town of Mountainside was gone. Or perhaps he never really existed at all, and was a construct of her meeting one real crazy and one incompetent thief. Even if they were the same person, she had seen no sign of him since the street fight. That was not as long ago as it seemed, but perhaps it was long enough.

Snake filled the waterskin and went back to camp. Melissa had not yet returned. Snake puttered around, getting together a meal of dried provisions that looked and tasted the same even after they had been soaked and cooked. She unrolled the blankets. She opened the serpent case, but Mist remained inside. The cobra often stayed in her dark compartment after a long trip, and grew bad-tempered if disturbed from the stillness. Snake felt uneasy, too, with Melissa out of sight. She could not dispel her discomfort by reminding herself that Melissa was tough and independent. Instead of checking on the sand viper, or even opening Sand's compartment so the rattler could come out, she stood up to call her daughter. Suddenly Slate and Squirrel shied violently, snorting in fear, Melissa cried "Snake! Look out!" in a voice of warning and terror, and rocks and dirt clattered down the hillside.

Snake ran toward the sound of scuffling, the knife on her belt half-drawn. She rounded a boulder and slid to a stop.

Melissa struggled violently in the grasp of a tall, cadaverous figure in desert robes. He had one hand over her mouth and the other around her, pinning her arms. She fought and kicked but the man did not react in either pain or anger.

"Tell her to stop," he said. "I won't hurt her." His words were thick and slurred, as if he were intoxicated. His robes were torn and soiled and his hair stood out wildly. The irises of his eyes seemed paler than the bloodshot

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whites, giving him a blank, inhuman look. Snake knew immediately that this was the crazy, even before she saw the ring that had cut her forehead.

"Let her go," she said.

"I'll trade you. Even trade."

"We don't have much, but it's yours. What do you want?"

"The dreamsnake," he said. "No more than that." Melissa struggled again and the man gripped her more cruelly.

"All right," Snake said. "I haven't any choice, have I? He's in my case."

He followed her back to camp. The old mystery was solved, a new one created.

Snake pointed to the case. "The top compartment."

The crazy sidled toward it, pulling Melissa along. He reached toward the clasp, then jerked back. He was trembling.

"You do it," he said to Melissa. "For you it's safe."

Without looking at Snake, Melissa reached for the clasp. She was very pale, for unlike Snake she was not immune to venoms.

"Stop it," Snake said. "There's nothing in there."

Melissa let her hand fall to her side, looking at Snake with mixed relief and fear.

"Let her go," Snake said again. "If the dreamsnake is what you want, I can't help. He was killed before you even found my camp."

Narrowing his eyes, he stared at her, then turned and reached for the serpent case. He flicked the catch open and kicked the whole thing over.

The grotesque sand viper lurched out in a tangle, writhing and hissing. It raised its head as if to strike, but both the crazy and Melissa stood frozen. The viper slid away. Snake sprang forward and pulled Melissa to safety, but the crazy did not even notice.

"Trick me!" Suddenly he laughed hysterically and raised his hands to the sky. "That would give me what I need!" Laughing and crying, with tears streaming down his face, he sank to the ground.

Snake moved quickly toward the rocks, but the sand viper had disap-

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peared. Scowling, resting her hand on her knife, she stood over the crazy. The vipers were rare enough on the desert: they were nonexistent in the foothills. Now she had nothing at all to take back to her teachers.

"Get up," she said. Her voice was harsh.

The crazy remained in his crumpled heap, crying quietly.

"What's wrong with him?" Melissa asked.

"I don't know." Snake toed him in the side. "You. Stop it. Get up."

He did not reply or react.

"He jumped out of a big pile of rocks. I didn't even think to watch for anybody there, it would have been so hot."

"Are you okay?"

"Yeah," Melissa said. "But he let that viper go."

The man moved weakly at their feet. His wrists protruded from ragged sleeves; his arms and hands were like bare branches.

"I should have been able to get away from *him*," Melissa said in disgust.

"He's stronger than he looks," Snake said. "For gods' sake, man, stop all that howling. We're not going to do anything to you."

"I'm already dead," he whispered. "You were my last chance so I'm dead."

"Your last chance for what?"

"For happiness."

"That's a lousy kind of happiness," Melissa said, "that makes you wreck things and jump out on people."

He glared up at them, tears streaking his skeletal face. "Why did you come back? I couldn't follow you any more. I wanted to go home to die, if they'd let me. But you came back. Right back to me." He buried his face in his tattered sleeves, and his shoulders trembled and shook.

Snake knelt down and urged him to his feet. She had to support most of his weight herself. Melissa stood warily by, then shrugged and came to help. At their half-settled camp they lowered him to the ground and pillowed his head on a saddle, where he lay staring blankly at the sky.

"He isn't going to do anything, is he?" Melissa asked.

"I don't think so."

"He made me drop the firewood." Clearly disgusted, Melissa strode toward the rocks.

"Melissa—"

She glanced back.

"I hope that sand viper just kept on going, but he might still be over there. We don't really need a fire."

Melissa hesitated so long that Snake wondered if she preferred the company of the sand viper to that of the crazy, but in the end she shrugged and went the other way.

Snake held the water flask to the crazy's lips.

"What's your name?"

She waited, but he did not answer. She had begun to wonder if he had gone catatonic when he shrugged, deeply and elaborately.

"You must have a name."

"I suppose," he said. "I suppose I

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must have had one once."

"Why did you want my dreamsnake? Are you dying?"

"I told you that I was."

"Of what?"

"Need. . . ."

Snake frowned. "Need for what?"

"For a dreamsnake."

Snake sighed. "I can't help you if you don't tell me what's wrong."

He jerked himself upright, scrabbling at the neck of his robe until it ripped, baring his throat. "That's all you need to know!"

Snaked looked closer. Among the rough dark hairs of the crazy's growing beard she could see numerous tiny scars, all in pairs, clustered over the carotid artery. She rocked back, startled. A dreamsnake's fangs had left those marks, she had no doubt of that. But she could not even imagine, much less recall, a disease so severe and agonizing that it would require that much venom to ease the pain yet in the end leave its victim alive. Those scars had been made over a considerable time, for some were old and white, some so fresh and pink and shiny that they must still have been scabbed over when he first rifled her camp.

"Now do you understand?"

"No," Snake said. "I don't."

She waited again, impatient but unwilling to take the chance of sidetracking him.

The crazy licked his lips. "Water . . . please?"

Snake held the flask to his lips and he drank greedily. He tried to sit up but his elbow slipped beneath him and he lay still, without even trying to speak. Snake's patience ended.

"Why have you been bitten so often by a dreamsnake?"

He looked at her, his pale, bloodshot eyes quite steady. "Because I was a good and useful supplicant and I took much treasure to the broken dome. I was rewarded often."

"Rewarded!"

His expression softened. "Oh, yes." He was no longer looking at but through her. "With happiness and the forgetfulness of dreams."

He closed his eyes and would not speak again, even when Snake prodded him roughly.

She joined Melissa, who had found a few dry branches on the other side of camp and now sat by a tiny fire.

"Someone has a dreamsnake," Snake said. "They're using the venom as a pleasure drug."

Melissa looked up at her, her twisted frown showing that she understood all that meant to Snake. "That's stupid," she said. "It's selfish. Why don't they use something that grows around here? There's lots of stuff."

"I don't know," Snake said. "I don't know for myself what the venom feels like. Where they got the dreamsnake is what I'd like to know. They didn't get it from a healer, not voluntarily."

Melissa stirred the soup. The firelight turned her red hair golden.

"Snake," she finally said, "when you came back to the stable that night—after you fought with him . . . he would have killed you if you'd let him. Tonight he would've killed me if

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he'd had a chance. If he has some friends and they decided to take something from a healer . . ."

"I know." Snake scratched intersecting lines on the ground with a sharp pebble, a meaningless design. "That's almost the only explanation that makes any sense."

It must have been midnight when Snake awoke. The fire had gone out, leaving the camp pitch dark. Snake lay without moving, expecting the sound of the crazy trying to free himself from the loose ropes with which she had bound him.

Melissa cried out in her sleep. Snake slid toward her, groping in the dark, and touched her shoulder.

"It's all right, Melissa," Snake whispered. "Wake up, you're just having a bad dream."

After a moment Melissa sat bolt upright.

"What—?"

Snake touched her again and she flinched violently.

"Melissa, it's me, it's Snake. You were having a nightmare."

Her voice shook. "I thought I was back in Mountainside. I thought Ras—"

Snake held her, stroking her soft curly hair. "I know. But he can't hurt you any more."

She felt Melissa nod.

"Do you want me to stay here with you?" Snake asked. "Or would that bring the nightmares back?"

Melissa hesitated. "Please stay," she whispered.

Snake lay down and pulled both blankets over them, for the night had turned cold. Melissa huddled against her, and a few moments later Snake knew by her breathing that she was asleep.

The crazy's voice was loud and whiny, but much stronger than it had been the night before.

"Let me up. Untie me. You going to torture me to death? I need to piss. I'm thirsty."

Snake threw off the blankets and sat up. She was tempted to offer him the drink of water first, but decided that was the unworthy fantasy of being awakened at dawn. She got up and stretched, yawning.

The crazy pulled at the ropes. "Well? You going to let me up?"

"In a minute." She used the privy they had dug behind some bushes, then returned to camp and untied the crazy. He sat up, rubbing his hands together and grumbling, then rose and started away.

"I don't want to invade your privacy," Snake said, "but don't go out of my sight."

He snarled something unintelligible but did not let the natural screen hide him completely. Scuffing back to Snake, he squatted down and grabbed for the water flask, drank thirstily, wiped his mouth on his sleeve, and looked hungrily around.

"Is there breakfast?"

"I thought you were planning to die."

He snorted.

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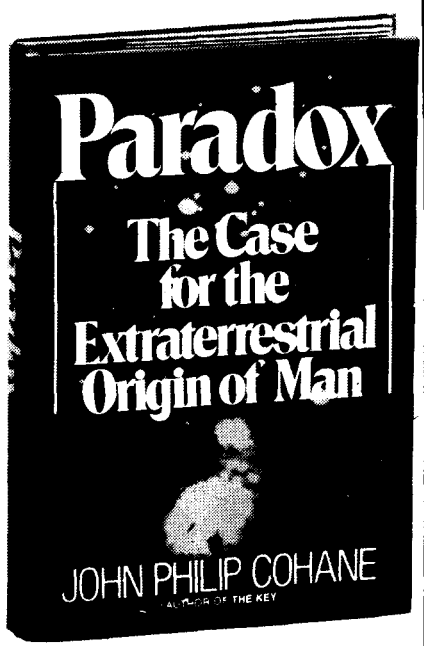

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"You can talk for your breakfast," Snake said.

The man looked at the ground and sighed. "All right," he said. He rested his forearms on his knees, letting his hands droop. His fingers trembled.

Snake waited, but he did not speak.

Two healers had vanished in the past few years. Snake still thought of them by their child-names, the names by which she had known them until they left on their proving years. She had not been extremely close to Philippe, but Jenneth had been her favorite older sister, one of the three people she had been closest to. She could still feel the shock of the winter and spring of Jenneth's testing year, as the days passed and the community slowly realized she would not return. They never found out what happened to her. Sometimes when a healer died a messenger would bring the bad news to the station, and sometimes even the serpents were returned. But the healers never had any message from Jenneth. Perhaps the crazy slumping before Snake had leapt on her in a dark alley somewhere, and killed her for her dreamsnake.

"Well?" Snake asked sharply.

The crazy started. "What?" He squinted at her, struggling to focus his eyes.

Snake kept her temper. "Where are you from?"

"South."

"What town?"

He shrugged. "No town. No town left, there. Just the broken dome."

"Where did you get the dreamsnake?"

He shrugged.

Snake leaped to her feet and grabbed his dirty robe. The cloth at his throat bunched in her fist as she pulled him upright. "Answer me!"

A tear trickled down his face. "How can I? I don't understand you. Where did I get it? I never had one. They were always there, but not mine. They were there when I went there and they were there when I left. Why would I need yours if I had some of my own?"

The crazy sank to the ground as Snake slowly unclenched her fingers.

" 'Some' of your own?"

He held out his hands, raising them to let the sleeves fall back to his elbows. His forearms, too, at the inside of the elbow, at the wrists, everywhere the veins were prominent, showed the scars of bites.

"It's best if they strike you all over at once," he said dreamily. "In the throat, that's quick and sure, that's for emergencies, for sustenance. That's all North will give you, usually. But all over, if you do something special for him, that's what he gives you." The crazy hugged himself and rubbed his arms as if he were cold. He flushed with excitement, rubbing harder and faster. "Then you feel, you feel—everything lights up, you're on fire—everything—it goes on and on."

"Stop it!"

He let his hands drop to the ground and looked at her, blank-eyed again. "What?"

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"This North—he has dreamsnakes."

The crazy nodded eagerly, letting memory excite him again.

"A lot of them?"

"A whole pitful. Sometimes he lets someone down in the pit, he rewards them—but never me, not since the first time."

Snake sat down, gazing at the crazy yet at nothing.

"Where does he get them?" she asked. "Do the city people trade with him? Does he deal with the offworlders?"

"Get them? They're there. North has them."

Snake was shaking as hard as the crazy. She clasped her hands around her knees, tensing all her muscles then slowly making herself relax. Her hands steadied.

"Why did you come right back to me when you don't have any?" the crazy said plaintively. "Why didn't you let me die?"

"You aren't about to die," Snake said. "You're going to live until you take me to North and the dreamsnakes. After that whether you live or die is your own business."

The crazy stared at her. "But North sent me away."

"You don't have to obey him anymore," Snake said. "He has no more power over you, if he won't give you what you want."

The crazy stared at her for a long time, blinking, frowning in deep thought. Suddenly his face grew serene and joyful. He started toward her, stumbled, and crawled. On his knees beside her he caught her hands.

"I'll help you get some of the dreamsnakes, and then you'll give me one of my own." He smiled. "To use any time."

Snake pulled her hands back as the crazy bent to kiss them. "Yes," she said, through clenched teeth.

Now she had promised him, and though she knew it was the only way she could get his cooperation, she felt as if she had committed a terrible sin.

Snake was glad to be back in the mountains where they could travel by day. The morning was cool and eerie, the trails narrow and fog-laden. The horses waded through the mist like aquatic creatures, tendrils swirling around their legs. Snake inhaled deeply until the cold air hurt her lungs. She could smell the fog, and the rich humus, and the faint spicy tang of pitch. The world lay green and gray around her, for the leaves on the overhanging trees had not yet begun to turn. Higher on the mountain, the darker evergreens looked almost black.

It was a relief not to have to ride double with the crazy. Mounted on a lop-eared old nag, he ambled along behind. Just after breaking camp they had met two youngsters, herders hunting strays, and Snake had bought one of their pack horses. She had had to press payment on them. Their reluctance to let her have the animal had not been an attempt to raise the price.

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Rather, they were embarrassed. Well, no less was Snake. But the crazy had refused any other horse; only this one was calm enough.

Now, even farther behind than usual, audible but not visible, the crazy talked to himself and sang softly and off key. His voice grew fainter and fainter. Impatiently, Snake reined Slate in to let him catch up. Melissa stopped even more unwillingly. She would not ride any closer to him than she had to.

After several minutes, the old horse shambled through the mist, eyes half-closed and ears flopping. The crazy hummed tunelessly.

"Does the trail look familiar yet?"

The crazy gazed smiling at her. "It's all the same to me," he said, and laughed.

Snake sighed. She had no idea if the broken dome was half a day's ride or half a year's away, from what the crazy had told her. Because of the freshness of his scars she knew it could not be too far, but she wished she was at least sure they were on the right trail. She let the crazy's horse pass them so he could lead.

"I don't think he's taking us anyplace, Snake," Melissa said. "I think he's just leading us around so we have to take care of him. We ought to leave him here and go somewhere else."

The crazy stiffened. Slowly, he turned around. The old horse stopped. Snake was surprised to see a tear spill from the crazy's eye and drip down his cheek.

"Don't leave me," he said. His expression and his tone were simply pitiful. Before this he had not seemed capable of caring so much about anything at all, even the dreamsnakes. He gazed at Melissa, blinking his lashless eyelids. "You're right not to trust me, little one," he said. "But please don't abandon me." His eyes unfocused and his words came from very far away. "Stay with me to the broken dome, and we'll both have our own dreamsnakes. Surely your mistress will give you one." He leaned toward her, reaching out, his fingers curved like claws. "You forget pains and troubles, you'll forget your scars—"

Melissa jerked back with an incoherent curse of surprise and anger. She clamped her legs against Squirrel's sides and put the tiger-pony into a gallop from a standstill, leaning close over his neck and never looking back. In a moment the trees obscured all but the muffled thud of Squirrel's hooves.

Snake glared at the crazy. "How could you say such a thing to her?"

He blinked, confused. "What did I say wrong?"

"You follow us, you understand? Don't go off the trail. I'll find her and we'll wait for you." She cantered after Melissa. The crazy's pained voice drifted after her.

"But why did she do that?"

Snake did not have to go far. Where the trail started to rise again, turning toward the slope of the valley and another mountain, Melissa stood beside Squirrel, hugging his neck as he

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nuzzled her shoulder. Hearing Slate approach, Melissa wiped her face on her sleeve and looked around. Snake dismounted and went toward her.

"I was afraid you'd go a long way," she said. "I'm glad you didn't."

"You can't expect a horse to run uphill just after he's been lame," Melissa said matter-of-factly, but with a trace of resentment.

Snake held out the reins of Slate's bridle. "If you want to ride hard and fast for a while you can take Slate."

Melissa stared at her as if trying to perceive some sarcasm in her expression that had been absent from her tone. She did not find it.

"No," Melissa said. "Never mind. Maybe it would help, but I'm all right. It's just—I don't want to forget. Well, I do, but not like that."

Snake nodded. "I know."

Melissa embraced her with one of her abrupt, self-conscious hugs. Snake held her and patted her shoulder. "He *is* crazy."

"Yeah." Melissa drew back slowly. "I know he can help you. I'm sorry I can't keep from hating him. I've tried."

"So have I," Snake said.

They sat down to wait for the crazy to come at his own slow pace.

Before the crazy had even begun to recognize the countryside or the trail, Snake saw the broken dome. She looked at its hulking shape several moments before she realized, with a start, what it was. At first it looked like another peak of the mountain ridge; its color, gray instead of black, attracted Snake's attention. She had expected the usual hemisphere, not a tremendous irregular surface that lay across the hillside like a quiescent amoeba. The main translucent gray was streaked with colors and reddened by afternoon sunlight. Whether the dome had been constructed in an asymmetrical form or whether it began as a round plastic bubble and was melted and deformed by the forces of the planet's former civilization, Snake could not tell. But it had been in its present shape for a long, long time. Dirt had settled in the hollows and valleys on its surface, and trees and grass and bushes grew thick in the sheltered pockets.

A broken dome. The words fit together strangely. Domes did not break, they did not weather, they did not change.

Snake touched Melissa's shoulder and pointed. Melissa saw the dome and exclaimed softly, then smiled with excitement and relief. Snake grinned back.

"That's it, isn't it?" Snake said to the crazy.

"Not yet," he said. "No, not yet. I'm not ready."

"How do we get up there? Ride?"

"North will see us. . . ."

Snake shrugged and dismounted. The way to the dome was steep and she could see no trail. "We walk, then." She unfastened the girth-straps of the mare's saddle. "Melissa—"

"No!" Melissa said sharply. "I won't stay down here while you go up

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there alone with that one. Squirrel and Slate will be okay and nobody will bother the case. Except maybe another crazy and they'll deserve what they get."

Snake sat down on a fallen log and motioned to her daughter to sit beside her. Melissa did so, without looking up at Snake, her shoulders set in defiance.

"I need your help," Snake said. "I can't succeed without you. If something happens to me—"

"That's not succeeding!"

"In a way it is. Melissa . . . the healers need dreamsnakes. Up in that dome they have enough to use them for play. I have to find out how they got them. But if I can't, if I don't come back down, you're the only way our people will know what happened to me. And why it happened. You're the only way they'll know about the dreamsnakes."

Melissa stared at the ground, rubbing the knuckles of one hand with the fingernails of the other. "This is very important to you, isn't it?"

"Yes."

Melissa sighed. Her hands were fists. "All right," she said. "What do you want me to do?"

Snake hugged her. "If I'm not back in, oh, two days, take Slate and Squirrel and ride north. Keep on going past Mountainside and Middlepass. It's a long way, but there's plenty of money in the case." Melissa knew how to open the hidden compartment.

"I have my wages from Mountainside," Melissa said.

"All right, but the other's just as much yours. You don't need to open the compartments Mist and Sand are in. They can survive until you get home." For the first time she actually considered the possibility that Melissa might have to make the trip alone. "Sand is getting too fat anyway." She forced a smile.

"But—" Melissa cut herself off.

"What?"

"If something does happen to you, I couldn't get back in time to help, not if I go all the way to the healers' station."

"If I don't come back on my own, there won't be any way to help me. Don't come after me by yourself. Please. I need to know you won't."

"If you don't come back in three days, I'll go tell your people about the dreamsnakes."

Snake let her have the extra day, with some gratitude, in fact. "Thank you, Melissa."

They let the tiger-pony and the gray mare loose in a clearing near the trail. Instead of galloping into the meadow and rolling in the grass, they stood close together, watchful and nervous, their ears swiveling, nostrils wide. The crazy's old horse stood in the shade alone, his head down. Melissa watched them, her lips tight.

The crazy stayed where he had dismounted, staring at Snake, tears in his eyes.

"Melissa," Snake said, "If you do go home alone, tell them I adopted you. Then—then they'll know you're their daughter, too."

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"I don't want to be their daughter. I want to be yours."

"You are. No matter what." Snake hugged her one last time, and Melissa held tight, reluctant to let her go.

"It'll be all right," Snake said. "Don't worry."

The crazy climbed surprisingly quickly and very noisily. Snake scrambled up a few meters of harsh black stone and grabbed his robe. "Not so fast."

His breath came loud and rough, from excitement, not effort. "The dreamsnakes are near," he said. He jerked his robe from her hand and scuttled up sheer rock. The next time Snake caught him, near the top of the cliff, she grabbed him by the shoulder and made him stop.

"We'll go on more slowly and more quietly from here. Otherwise your friends will know we're coming before we're ready to have them know."

"The dreamsnakes—!"

"North is between us and the dreamsnakes. If he sees you first will he let you go on?"

"You'll give me a dreamsnake? One of my own? Not like North?"

"Not like North," Snake said.

She chinned herself over the edge of the cliff to the broken dome's ridge. The strangeness of the place hit Snake like a physical blow. Alien plants grew all around the base of the tremendous half-collapsed structure, nearly to the cliff, leaving no clear path. What covered the ground resembled nothing Snake knew, not grass or scrub or bushes. It was a flat, borderless expanse of bright red leaf. Looking closer, Snake could see that it was more than a single tremendous leaf: each section was perhaps twice as long as she was tall, irregularly shaped, and joined at the edges to neighboring leaves by a system of intertwining hairs. Wherever more than two leaves touched, a delicate frond rose a few handsbreadths from the intersection.

The depressions in the surface of the dome retained some normal vegetation. But alien plants as well had reached the top of the dome. The melted hollows were filled randomly, some with ordinary green, others with bold unearthly colors. In a few of the seared, heat-sunken pockets, high above the ground, the colors warred together, one not yet having overcome the other.

Inside the translucent dome, tall shapes showed as shadows, indistinct and strange. Between the edge of the cliff and the dome there was no cover, nor was there any other approach. Snake became painfully aware of her visibility, for she was standing silhouetted against the sky.

The crazy clambered up beside her. "We follow the path," he said, pointing across the flat-leaves that no trail parted.

Snake stepped forward and put her boot carefully on the edge of the flat-leaf. Nothing happened. It was no different from stepping on an ordinary leaf. Beneath it, the ground felt as solid as any other stone.

She started across the barely-yield-

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ing leaves, placing her feet cautiously. The crazy followed.

"North likes new people," he said. "He likes it when they come and ask him to let them dream." His voice grew wistful. "Maybe he'll like me again."

Snake's boots left marks on the red flat-leaves, blazing her path across the outcropping that held the broken dome. She only looked back once: her footsteps lay in livid purple bruises against red all the way back to the cliff edge. The crazy's trail was much fainter. He crept along behind her, a little to one side so he could always see the dome, not quite as frightened of this person North as he was attracted by the dreamsnakes.

The half-melted oblong bubble was even larger than it looked from the cliff. Its translucent flank rose in an immense and gentle curve to the highest point of the surface, many times Snake's height. The side she approached was streaked with multicolored veins. They did not fade to the original gray until they reached the far end of the dome, a long way to Snake's right. To her left, the streaks grew brighter as they approached the structure's narrower end.

Snake reached the dome. The flat-leaves grew up along its sides to the level of her knees, but above that the plastic was clean. Snake put her face up close to the wall, peering between a stripe of orange and one of purple, cutting off the exterior light with her hands, but the shapes inside were still indistinct. Nothing moved.

She followed the intensifying bands of color.

As she rounded the narrow end, she saw why it was called the broken dome. Whatever had melted the surface had a power Snake could not comprehend, for it had also blasted an opening in a material she had believed indestructible. The rainbow streaks radiated from the hole along buckled plastic. The heat must have crystallized the substance, for the edges of the opening had broken away, leaving a huge jagged entrance. Globs of plastic, fluorescent colors glowing among alien plants, lay all over the ground.

Snake approached the entrance cautiously. The crazy began his half-humming moan of fear.

"Shh!" Snake did not turn back, but he subsided.

Fascinated, Snake climbed through the hole. She felt the sharp edges against her palms but did not really notice them. Beyond the opening, where the side wall, when intact, had curved to form the roof, an entire archway of plastic was slumped to barely more than Snake's height. Here and there the plastic had run and dripped and formed ropes from ceiling to floor. Snake reached out and touched one gently. It thrummed like a giant harpstring, and she grabbed it quickly to silence it.

The light inside was reddish and eerie; Snake kept blinking her eyes, trying to clear her vision. But nothing was wrong with her sight except that it could not become accustomed to the alien landscape and light. The dome

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had enclosed an alien jungle, now gone wild. A great vine with a stem bigger around than the largest tree Snake had ever seen climbed up the wall, huge suckers probing the now-brittle plastic, punching through to precarious holds in the dome. The vine spread a canopy across the ceiling, its bluish leaves tiny and delicate, its flowers tremendous but made up of thousands of white petals even smaller than the leaves. Snake moved farther into the dome, to where the melting, less severe, had not collapsed the ceiling. Here and there a vine crept up the edge, then dropped back to earth where the plastic was too strong to break and too slick to grasp. After the vines, the trees took over, or what passed for trees inside the dome. One stood on a hummock nearby: a tangled mass of woody stalks, or limbs, piled and twisted far above Snake's head, spreading slowly to shape the plant into a cone with the wide end at the top, its tip buried somewhere beneath the earth.

Recalling the crazy's vague description, Snake pointed toward a central hill that rose almost to touch the plastic sky. "That way, hm?" She found herself whispering.

Half-crouched behind her, the crazy mumbled something that sounded affirmative. Snake set out, passing beneath the lacy shadows of the tangletrees and through occasional areas of colored light where the dome's rainbow wounds filtered sunlight. As Snake walked she listened carefully, for the sound of another human voice, for the faint hissing of nested snakes, for anything. But even the air was still.

The ground began to rise: they reached the foot of the hill. Here and there black volcanic rock pierced the topsoil, the alien earth for all Snake knew. It looked ordinary enough, but the plants growing from it did not. Here the ground cover looked like fine brown hair and had the same slick texture. The crazy led on, following a trail that was not there. Snake trudged after him. The hillside steepened and sweat beaded on her forehead.

They climbed higher, and still no one challenged them. The sweat on Snake's face dried: the air was growing cooler. The crazy, grinning and mumbling to himself, climbed more eagerly. The coolness became a whisper of air running downhill like water. Snake had expected the hilltop, right up under the crown of the dome, to be warm with trapped heat. But the higher she climbed, the colder and stronger the breeze became.

They entered a stand of trees similar to the ones below, still formed from tangled branches and compact twisted roots, but only a few meters high. They clustered together in small groves of three or more, deforming each other's symmetry. The forest thickened. Finally, winding between the twisted trunks, a pathway appeared. As the forest closed in over her, Snake caught up with the crazy and stopped him.

"From now on stay behind me, all right?"

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He nodded without looking at her.

The dome diffused sunlight so nothing cast a shadow, but the light was barely bright enough to penetrate the twisting, knotted branches just overhead. Tiny leaves shivered in the cold breeze that blew through the forest corridor. Snake moved forward. The rocks beneath her boots had given way to a soft trail of humus and fallen leaves.

To the right a tremendous chunk of stone rose up out of the hillside at a gentle slant, forming a ledge that would overlook the larger part of the dome. Snake considered climbing out on it, but it was too exposed. She did not want North to be able to accuse her of spying, and she did not want him to know of her presence until she walked into his camp. Pressing on, she shivered, for the breeze had become a cold wind.

She glanced around to be sure the crazy was following her. As she did, he scurried up the rock ledge, waving his arms. Startled, Snake hesitated. Her first thought was that he had decided again to die. In that instant Melissa dashed after him.

"North!" he cried, and Melissa flung herself at his knees, hitting him with her shoulder and knocking him down. Snake ran toward them as Melissa fought to keep him from getting up and he fought to free himself. His single shout echoed and re-echoed, rebounding from the walls and the half-melted undulations of the dome.

Snake knelt and pulled Melissa away from the crazy, as gently as she could. The crazy lurched around, ready to scream again, but Snake drew her knife and held it beneath his chin. Her other hand was clenched in a fist. She opened it slowly and slapped the ground hard.

"Why did you do that? *Why?* We had an agreement."

"North—" he whispered. "North will be angry with me. But if I bring him new people . . ." His voice trailed off. Snake looked at Melissa, and Melissa looked at the ground.

"I didn't promise not to follow you," she said. "I made sure of that. I know it's cheating, but . . ." She raised her head and met Snake's gaze. "There are things you don't know about people. You trust them too much. There are things I don't know, a lot of them, I know that, but they're different things."

"It's all right," Snake said. "You're right, I did trust him too much. Thank you for stopping him."

Melissa shrugged. "A lot of good I did. They know we're here now, wherever they are."

Snake slid her knife back into its sheath. "Melissa, you've got to get out of the dome."

"Please come with me," Melissa said. "Nothing makes any sense around here."

"Someone has to tell our people about this place."

"I don't care about your people! I care about you! How can I go to them and tell them I let you get killed?"

"Melissa, please, there isn't time to argue."

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"You should let me stay with you," Melissa said. She turned around, shoulders slumped, and started down the trail.

"You'll get your wish, little one." The voice was deep and courteous.

For an instant Snake thought the crazy had spoken in a normal tone, but he was cowering on the bare rock beside her, and a fourth person now stood on the trail. His form was eerie in the dim light, for he was very tall, pathologically tall: pituitary gigantism, Snake thought. Beneath the dense tangle-trees he had to stoop. Emaciation accentuated every asymmetry of his body. He was dressed all in white, and he was albino as well, with chalk-white hair and eyebrows and eyelashes, and very pale blue eyes. Melissa, stopping short, stared up at him and then backed away.

"North!" the crazy cried. "North, I brought new people. And I warned you, I didn't let them sneak up on you. Did you hear me?"

"I heard you," North said. "And I wondered why you disobeyed me by coming back."

"I thought you'd like these people."

"And that's all?"

"Yes!"

"Are you sure?" The man's smile was more cruel than kind.

"Please, North—let me come back. I've brought two followers—"

Snake touched the crazy's shoulder; he fell silent.

"Why are you here?"

In the last few weeks, Snake had grown wary enough not to tell North immediately that she was a healer. "For the same reason as anyone else," she said. "I've come about the dreamsnakes."

"You don't look like the kind of person who usually finds out about them." He came forward, looming over her in the dimness. He glanced from her to the crazy, and then looked more carefully at Melissa. His hard gaze softened. "Ah, I see. You've come for her."

Melissa nearly snarled a denial: Snake saw her start with anger, then forcibly hold herself calm.

"We've all three come together," Snake said. "For the same reason."

"And what did you bring me, to initiate you?"

"I don't understand," Snake said.

North's brief, annoyed frown dissolved in a laugh. "That's just what I'd expect from this poor fool. He brought you here without explaining our customs."

"But I brought them, North. I brought them for you."

"And they brought you for me? That's hardly sufficient payment."

"Payment can be arranged," Snake said, "when we reach an agreement."

North hobbled a few steps closer. "My dear child, you really don't understand. Once you join my camp, you don't leave for anything until I'm certain of your loyalty. In the first place you won't want to leave. In the second, when I send someone out it's proof that I trust them. It's an honor."

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Snake nodded toward the crazy. "And him?"

North laughed without cheer. "I didn't send him out. I exiled him."

"But I know where their things are, North!" The crazy pulled away from Snake. "You don't need them, just me." Kneeling, he wrapped his arms around North's legs. "Everything's in the valley. We only need to take it."

Snake shrugged when North glanced from the crazy to her. "It's well-protected. He could lead you to my gear but you couldn't take it." Still she did not tell him what she was.

North extricated himself from the crazy's arms. "I am not strong," he said. "I don't travel to the valley."

A small heavy bag landed at North's feet. He and Snake both looked at Melissa.

"If you need to be paid just to talk to somebody," Melissa said belligerently, "there."

North bent painfully down and picked up Melissa's wages. He opened the sack and poured the coins out into his hand. Even in the inadequate light, they glittered. He shook the gold pieces up and down thoughtfully.

"All right, this will do as a beginning. You'll have to give up your weapons, of course, and then we'll go on to my home."

Snake took her knife from her belt and tossed it on the ground.

"Snake—" Melissa whispered. She looked up at her, stricken.

"If we want him to trust us, we have to trust him," Snake said. Yet she did not trust him, and she did not want to trust him. Still, knives would be of little use against a group of people, and she did not think North had come alone.

My dear daughter, Snake thought, I never said this would be easy.

Melissa flinched back as North took one step toward her. Her knuckles were white.

"Don't be afraid of me, little one. And don't try to be clever. I have more resources than you might imagine."

Melissa looked at the ground, slowly drew her knife, and dropped it at her feet.

North ordered the crazy to Melissa with a quick jerk of his head. "Search her."

Snake put her hand on Melissa's shoulder. The child was taut and trembling. "He need not search her. I give you my word that Melissa carries no other weapons." Snake could sense that her daughter had controlled herself nearly to her limit.

"All the more reason to search her," North said. "We'll not be fanatic about the thoroughness. Do you want to be first?"

"That would be better," Snake said. She raised her hands, but North prodded her, turned her around, then made her reach out, lean forward, and grasp the twisted branches of a tree. If she had not been worried about Melissa she would have been amused by the theatricality of it all.

Nothing happened for what seemed a long time. Snake started to turn around again, but North touched the fresh shiny puncture scars on her hand

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with the tip of one pale finger, tracing the spot where the sand viper had bitten her. "Ah," he said, very softly, so close she could feel his warm unpleasant breath. "You're a healer."

Snake heard the crossbow just after the bolt plunged into her shoulder, just as the pain spread over her in a wave. Her knees swayed but she could not fall. The force of the bolt dissipated through the trunk of the twisted tree, in vibrations up and down her body. Melissa screamed—in fury, not in pain. Snake heard other people behind her. Blood ran hot down her shoulder blade, down her breast. With her left hand, she fumbled for the shaft of the thin crossbow bolt where it ripped out of her flesh and into the tree, but her fingers slipped and the living wood held the bolt's tip fast. Melissa was at her side, holding her up as best she could. Voices wove themselves into a tapestry stretching behind her.

She fainted.

The coldness roused Snake first. Even half-conscious, she was surprised to be aware at all. The hatred in North's voice when he recognized her profession had left her no hope. Her shoulder ached fiercely, but without the stabbing, thought-destroying pain.

She struggled up, shivering, blinking, her vision blurred. "Melissa?"

Nearby, North laughed. "Not being a healer yet, she hasn't been hurt."

"Where is she?"

"She's safe," North said. "She can stay with us. You needn't worry, she'll be happy here."

"She didn't want to come in the first place. This isn't the kind of happiness she wants. Let her go home."

"As I said before, I have nothing against her."

"What is it you have against healers?"

North gazed at her steadily for a long time. "I should think that would be obvious."

"I'm sorry," Snake said. "We could probably give you some ability to form melanin, but we aren't magicians." Her boots were gone; the cold stone sucked heat from the bare soles of her feet. She shivered violently and pain struck with even more ferocity than before. She gasped and closed her eyes, then sat very still in her own inner darkness, breathing deeply and shutting away the pain. She hoped Melissa was somewhere warmer, and she wondered where the dreamsnakes were, for they needed heat to survive.

She opened her eyes. "And your height—" she said.

North laughed bitterly. "Of all the things I've said about healers, I never said they didn't have nerve!"

"What?" Snake asked, confused. She was light-headed from loss of blood, and in the middle of answering North's question. "We might have helped if we'd seen you early. You must have been grown before anyone took you to a healer."

North's pale face turned scarlet with fury. "Shut up!" He leaped to his

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BIOLOG

by Jay Kay Klein

A woman of many talents, Joan D. Vinge has a Summa Cum Laude degree in anthropology, has worked as a salvage archaeologist, and is becoming a well-known science fiction writer. She was raised in San Diego, meeting her husband while attending the state university there, where he teaches mathematics. Vernor already had sold science fiction, as far back as 1965 in a British magazine, with a first appearance in Analog the following year. Joan's first story was sold in 1973 to Orbit 14, *while her first Analog story was a collaboration with her husband in the August 1975 issue. ("The Peddlar's Apprentice.")*

A science fiction fan since junior high school, Joan considers it odd that people still think women don't read science fiction, since all of her friends do so. She now writes full time, mostly after midnight when it's quieter. Her interest in archaeology was stimulated by knowing she is part Amerindian. She carries her acquired scientific viewpoints and insights into her writing, considering science fiction the anthropology of the future.

Joan is still on the uphill side of 30, has owned a horse for the past ten years, and is fond of needlework, plants, and cats. Among her unusual accomplishments is having escaped the Jay Kay Klein camera, so that for her "Biolog" portrait she called upon the services of Nozizwe Siwundhla. And no story of her life would be complete without the notation that she cheerfully swims upstream against long-cherished notions of the majority, such as Joan's having concluded that Richard III was framed by the Tudors. Her first really long novel is now in preparation, and ought to be v-e-r-y interesting. It will be called Carbuncle.

Nozizwe Siwundhla

Joan D. Vinge

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feet and dragged Snake up. She hugged her right arm to her side.

"Do you think I want to hear that? Do you think I want to keep hearing that I might have been ordinary?" He pushed her toward the cave. She stumbled but he dragged her up again. "Healers! Where were you when I needed you? I'll let you see how I feel—"

"North, please, North!" Snake's crazy plucked at North's sleeve. "She helped me, North, I'll take her place."

"Your brain's addled," North said. "Or you think mine is."

The interior of the cave glittered in the dim light of smoking torches, its walls flawed jewels of ice. Every step Snake took jarred her shoulder into pain again, and she no longer had the strength to force the sensation away.

After a long distance the tunnel grew lighter. It ended suddenly, opening out into a depression in the top of the hill, like the crater of a volcano but clearly human-made. The black eyes of other caves stared back at her, and the dome above formed a gray directionless sky. North pushed Snake forward again. She saw things, felt things, but reacted to nothing. She could not.

"Down there. Climb."

In the center of the crater, a rope ladder led into the darkness of a deep crevasse.

"Climb," North said again. "Or be thrown."

"North, please," the crazy moaned, and Snake suddenly realized where she was being sent. North stared at her while she laughed. She felt as if strength were flowing into her, drawn from the wind and the earth.

"Is this how you torture a healer?" she said. Clumsily but eagerly, one-handed, she lowered herself by steps into the freezing darkness.

"We'll see how you feel in the morning," North said.

The crazy's voice rose in terror. "She'll kill all the dreamsnakes, North!"

"I'd like to see that," North said. "A healer killing dreamsnakes."

Snake heard the soft rustling slide of small serpents. Clutching the ladder, she hung against the stone and squinted down into dimness. Light penetrated in a long narrow streak down the center of the crevasse.

A dreamsnake slid smoothly from one edge of darkness to the other.

Snake fumbled her way the last few meters, stepping to the floor as cautiously as she could, feeling around with her numb bare foot until she was certain nothing moved beneath it. She reached out among the shards, feeling carefully. Her fingertips brushed smooth scales, and two tiny points of pain stung her hand. In the dimness, she saw the serpent move. Catching it, she smiled and held it behind the head, by habit conserving its venom. It was wild, not tame and gentle as Grass had been. It writhed and lashed itself around her hand; its delicate trident tongue flicked out at her, and in again to taste her scent.

As her eyes became more accus-

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tomed to the darkness, Snake gradually perceived all the other dreamsnakes, all sizes of them, lone ones, clumps of them, tangles of them, more than she had ever seen before in her life, more than the healers could collect in a single place if every one of her people returned to the station at the same time.

Once more she began to laugh. She knew she had to control herself: this was more hysteria than joy. But, for the moment, she laughed.

"Laugh away, healer." North's voice echoed darkly against stone. "We'll see how long you laugh."

"You're a fool!" She laughed at the hilarity of this punishment, like a child's story come true. She laughed until she cried, but for an instant the tears were real. She knew that when this torture did not harm her, North would find some other way. She sniffled and coughed and wiped her face on the tail of her shirt, for at least she had a little time.

And then she saw Melissa.

Her daughter lay crumpled on the broken stone in the narrow end of the pit. Serpents coiled against her body and made green tendrils in her auburn hair.

Snake knelt beside Melissa and gently, carefully plucked the wild serpents away. North's people had taken Melissa's robe, and cut her pants off at the knee. Her arms were bare, and her boots, like Snake's, were gone. Rope bound her hands and feet, chafing her wrists raw where she had struggled. Small bloody bites spotted her bare arms and legs. Snake remembered the crazy's words: "It's best if they strike you all over at once. . . ."

Snake untied Melissa's wrists and ankles, fumbling left-handed with the knots. Snake cradled her in her left arm as the wild dreamsnakes crawled over her own bare feet and ankles. Once more she wondered how they lived in such cold. She would never have dared let Grass loose in this temperature. Even the case would have been too cold: she would have brought him out, warmed him in her hands, and let him loop himself around her throat.

Snake managed to get Melissa in her lap, off the freezing ground. Her pulse was heavy and slow, her breathing deep. But each new breath came so long after the last that Snake was afraid she would stop altogether.

The cold pressed down around them, pushing back the ache in Snake's shoulder and draining her energy again. Stay awake, she thought. Stay awake. Melissa might stop breathing; her heart might stop from so much venom, and then she will need help. A pleasant thought insinuated itself into her mind: No one dies of dreamsnake venom. They live, or they die of their illness, in peace, when their time comes. It's safe to sleep, she will not die. But Snake knew of no one who had ever been given such a large dose of the venom, and Melissa was only a child.

A tiny dreamsnake slid between her leg and the side of the crevasse. She reached out with her half-numbed

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right hand and picked it up with wonder. Something about it was unusual: Snake looked closer.

It was an eggling, just hatched, for it still had the beak of horny tissue common to the hatchlings of many species of serpents. It was final proof of how North obtained his dreamsnakes. He had not found an offworld supply. He did not clone them. He had a breeding population. The eggling proved it.

She turned to lay the hatchling down behind her, but her hand knocked against the wall. Startled, the dreamsnake struck. The sharp stab of its tiny fangs made Snake flinch. The creature slid from her hand to the ground and on into shadows.

"Snake?" Melissa's voice, a rough whisper, roused Snake from the sleep she had fought so long.

"I'm here." She could just see her daughter's face. The last diffused light shone dully on her curly hair and the thick stiff scars. Her eyes held a faraway dazed look.

"I dreamed . . ." She let her voice trail away. "He was right!" she cried in sudden fury. "Damn him, he was right!" She flung her arms around Snake's neck and hid her face. Her voice was muffled. "I did forget, for a little while. But I won't again. I won't. . . ."

"Melissa—"

Melissa stiffened at the tone of her voice.

"I don't know what's going to happen. North says he won't hurt you." Melissa was trembling, or shivering. "If you say you'll join him—"

"No!"

"Melissa—"

"No! I won't! I don't care." Her voice was high and tight with fear. "It'd be just like Ras again. . . ."

"Melissa, dear, you have a place to go now. You have to give yourself a chance to get away."

Melissa huddled against her in silence.

"I'm scared," she whispered finally. "I said I wouldn't be any more, but I am. Snake, if I say I'll join him and he says he'll let me be bitten again I don't know what I'll do. I don't want to forget myself . . . but I did for a while, and . . ." She touched the heavy scar around her eye, something Snake had never seen her do before. "This went away. Nothing hurt any more. After a while I'd do anything for that." Melissa closed her eyes.

Snake grabbed one of the dreamsnakes and flung it away, handling it more roughly than she would have believed she could.

"Would you rather die?" she asked harshly.

"I don't know," Melissa said faintly, groggily. Her arms slipped from Snake's neck and her hands lay limp. "I don't know. Maybe I would."

"Melissa, I'm sorry, I didn't mean it—"

But Melissa was asleep or unconscious again. Snake could hear the dreamsnakes' scales on the damp slick rocks. For the first time in her life she felt afraid of serpents. To reassure

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herself, she reached out to feel the bare stone around her.

Her hand plunged into a mass of sleek scales, writhing bodies. She jerked back as a constellation of tiny points of pain spread across her arm. The dreamsnakes were seeking warmth, but if she let them find what they needed they would find her daughter as well. Her half-numb hand closed involuntarily around a heavy chunk of sharp volcanic rock. She lifted it, ready to smash it down on the wild dreamsnakes.

Snake lowered her hand and willed her fingers open. The rock clattered away, among other rocks. A hot tear rolled down her cheek. When it reached her chin it felt like ice. There were too many dreamsnakes to protect Melissa against, yet North was right. Snake could not kill them.

Desperate, she pushed herself to her feet, using the crevasse wall as support and wedging herself into the narrow space. Melissa was small for her age, and still very thin, but her limp weight seemed immense. The dreamsnakes coiled around Snake's ankles. Melissa slipped in her arms, and Snake clutched reflexively at her with her right hand. The pain shot through her shoulder and up and down her spine. She managed to brace herself half-sitting between the rock walls, and to hold Melissa above the serpents.

Light glimmered from above. Snake looked up slowly, but she did not move. In fact, she did not think she could move. Ropes and wood scraped against the crevasse wall and a platform sank smoothly on pulleys into the pit.

North himself was descending.

Snake could not hold Melissa tighter, or hide her from him, or even stand up and fight for her. North's lights illuminated the crevasse and Snake was dazzled.

North stepped from his platform as the pulley-ropes drooped down to its corners. Two of his followers flanked him, carrying lanterns.

"My dreamsnakes like you," North said, nodding toward Snake's feet where the serpents coiled around her legs, halfway to her knees. "But you mustn't be so selfish about them."

"Melissa doesn't want them," Snake said.

"I must say," he said, "I hardly expected you to be so lucid."

"I'm a healer."

North frowned a little, hesitating. "Ah. I see. Yes, I should have thought of that. You would have to be resistant to dreamsnakes, too, would you not." He nodded to his people and they put down their lanterns and came toward Snake. She shrank away from them, but she had nowhere to go. They walked gently among the jagged stones and the dreamsnakes. Unlike Snake the followers were heavily shod. One reached out to take Melissa from her.

"Stay away!" Snake cried, but an emaciated hand tried to ease Melissa from her arms. Snake lunged down and bit. She felt the cold flesh yield between her teeth until she met bone;

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she tasted the warm blood. She wished she had sharper teeth, sharp teeth with channels for poison.

North's follower pulled back with a yelp, tearing his hand away, and Snake spat out his blood. North and the others grabbed and held her while they took Melissa away from her. North twined his long fingers in her hair, holding her head back so she could not bite again. They forced her out of the narrow split in the rock. Fighting them, she staggered to her feet as one of the followers turned toward the platform with Melissa. North jerked her hair again and pulled her backwards. Her knees collapsed. She tried to get up again but she had nothing left to fight with. Her left hand around her right shoulder, blood trickling between her fingers, she sagged to the ground.

North let go of Snake's hair and went to Melissa, looking at her eyes and feeling her pulse. He glanced back at Snake.

"You shouldn't have kept her from my creatures."

Snake raised her head. "Why are you trying to kill her?"

"Kill her! I? You don't know a tenth what you think you know. You're the one who's endangered her." He left Melissa and came back to Snake, bending down to capture several serpents. He put them in a basket, holding them carefully so they could not bite.

"I'll have to take her out of here to save her life. She'll hate you for ruining her first experience. You healers

flaunt your arrogance."

Snake wondered if he was right about arrogance; if he was, then perhaps he was right, too, about Melissa, about everything. She could not think properly to argue with him. "Be kind to her," she whispered.

"Don't worry," North said. "She'll be happy with me." He nodded to his two followers. As they came toward Snake she tried to rise and prepare herself for one last defense. She was on one knee when the man she had bitten grabbed her by the right arm and pulled her to her feet, wrenching

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her shoulder again. The second follower held her up from the other side.

North leaned over her, holding a dreamsnake. "How certain are you of your immunities, healer? Are you arrogant about them, too?"

One of his people forced Snake's head back, exposing her throat. North was so tall that Snake could still watch him lower the dreamsnake. The fangs sank into her carotid artery. Nothing happened. She knew nothing would happen. She wished North would realize it and let her go, let her lie down on the cold sharp rocks to sleep, even if she never woke up. She was too tired to fight any more. Blood trickled down her neck to her collarbone. North's follower let go of her hair, and Snake saw North picking up another serpent.

When the second dreamsnake bit her, she felt a sudden flash of pain, radiating from her throat all through her body. She gasped as the pain receded, leaving her trembling.

"Ah," North said. "The healer is beginning to understand us." He hesitated a moment, watching her. "One more, perhaps," he said. "Yes."

When he bent over her again, his face was in shadow and the light formed a halo of his pale, fine hair. In his hands, the third dreamsnake was a silent shadow. Snake thought she felt the grip on her arms loosen for an instant, as if the followers who held her were hypnotized by the black gaze of the serpent. She lunged forward, and for a moment she was free, but fingers like claws dug into her flesh and the man she had bitten snarled in fury. He dragged her back, twisting her right arm with one hand and digging the nails of his other into her wounded shoulder. Snake stumbled, the strength flowing out of her like blood.

North, who had stepped away from the scuffle, came forward again. "Why fight, healer? Allow yourself to share the pleasure my creatures give." He brought the third dreamsnake to her throat.

It struck.

This time the pain radiated through her as before, but when it receded it was followed with her pulsebeat by another wave of agony. Snake cried out.

"Ah," she heard North say. "Now she does understand."

"No . . ." she whispered.

She silenced herself. She would not give North the satisfaction of her pain.

The followers released her and she fell forward, half-supporting herself with her left hand. This time the intensity of the sensation did not fade. It built, echoing and re-echoing through the canyon of her body, reinforcing itself, resonating. Snake shuddered with every beat of her heart. Trying to breathe between the agonizing spasms, she collapsed onto the cold hard rock.

Daylight filtered into the pit. Snake lay as she had fallen, one hand flung out before her. Frost silvered the ragged edges of her sleeve. A thick

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white coat of ice crystals covered the tumbled rock fragments on the pit's floor and crept up the side of the crevasse. Here and there wet trails cut the traceries, forming a second, harsher pattern. The stone-dark lines looked like the tracks of dreamsnakes, but that was ridiculous. It was too cold.

Then Snake heard the quiet rustle of scales on stone, and before she could move, she saw the serpents.

Two, no, three dreamsnakes twined themselves around each other only an armslength away. They writhed and coiled together, marking the frost with dark hieroglyphics that Snake could not read. The symbols had a meaning, of that she was sure, if she could just decipher them. Only part of the message lay within her view, so, slowly and stiffly, she turned her head to follow the connecting tracks. The dreamsnakes remained at the edge of her sight, rubbing against each other, their bodies forming triple-stranded helices.

The serpents were freezing and dying, that must be it, and somehow she had to call North and make him save them. Snake pushed herself up on her elbows, but she could move no farther. She struggled to move, to speak, but a wave of nausea overcame her. North and his creatures: Snake retched dryly, but there was nothing in her stomach to come up and help purge her of her revulsion. She was still under the effects of the venom.

The stabbing pain had faded to a deep throbbing ache. She forced it back, forced herself to feel it less and less, but she could not maintain the necessary energy. Overwhelmed, she fainted again.

She roused herself from sleep, not unconsciousness. All the hurts remained, but Snake knew she had beaten them when she forced them away, one by one, and they did not return. She was still free, and North could not enslave her with the dreamsnakes. Unless his followers worshipped him for pain, the venom could not affect her as it affected them. She did not know if the reason was her healers' immunities, or the resistance of her will. It did not really matter.

She did understand now why North had been so certain Melissa would not freeze to death. The cold remained, and Snake was aware of it, but she felt warm, even feverish. How long her body could sustain the increased metabolism she did not know, but she could feel her blood coursing through her and she knew she did not have to *fear frostbite.*

She remembered the dreamsnakes, active beyond possibility on the frost-jeweled ground. That all must have been a dream, she thought. But she looked around, and there among the dark hieroglyphics of their trails coiled a triplet of small serpents. She saw a second triplet, then a third, and suddenly in pure astonishment and delight she understood the message this place and its creatures had been trying to give her. It was as if she were the representative of all the generations of healers, sent here on purpose

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to accept what was offered.

Even as she wondered at how long it had taken to discover the dreamsnakes' secrets, she understood the reasons. Now that she had fought the venom off, she could understand what the hieroglyphics told her, and she saw much more than the many triplets of dreamsnakes copulating in the frigid pit.

By protecting the dreamsnakes, her people had prevented them from maturing. The mistake was inevitable, for they were too valuable to risk in experimentation. It was safer to count on the rarely successful nuclear-transplant clones and the occasional spontaneous maturation for a few new dreamsnakes than to threaten the lives of those the healers already had.

Snake smiled at the simplicity of the solution. Of course the healers' dreamsnakes so seldom matured. At some point in their development they needed this bitter cold. Of course they seldom mated, even the few that spontaneously matured: the cold triggered reproduction as well. And the last simplicity: hoping mature serpents would meet each other, the healers followed tedious plans to put the serpents together . . . two by two.

Isolated from new knowledge, the healers had understood that their dreamsnakes were alien, but they had not been able to comprehend, or even imagine, just how alien.

Two by two. Snake laughed silently.

Her mental laughter faded away into a sad smile of regret. She had made so many mistakes, her people had made so many mistakes: with dreamsnakes, they had only succeeded by mistake.

And now that Snake understood, perhaps it was all too late.

When Snake came to herself again, the frost and the cold had disappeared, and the black rock beneath her warmed her through. She eased herself upright, testing herself. Her shoulder merely ached. She did not know how long she had slept, but the healing had already begun.

Snake stood up: she felt unsteady, as if she had suddenly become very old. But her strength was still there; she could feel it gradually returning.

Moving slowly, she inspected her prison in daylight. Its walls were rough but not fissured; she could see no toe or fingerholds. The edge was three times higher than she could leap even when she was not injured. She could see only one possibility for escape, but she did not intend to leave without taking what she had come for.

Snake sat down and unwrapped Melissa's headcloth from her shoulder. The wound was not exactly clean, but it would not become infected and it was heavily scabbed over. For now, a bandage was unnecessary. She ripped a couple of narrow strips from one edge of the stained square of cloth and gathered the rest of it into a makeshift bag. Four big dreamsnakes lay languorously nearby. Snake captured

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them, put them in the sack, and looked for more. The ones she had were certainly mature, at that size, and perhaps one or even two were forming fertile eggs. She caught three other serpents, but the rest had vanished. She walked across the stones more carefully, looking for a sign of lairs, but found nothing. Either the holes were too well-concealed for her to find without a more careful search, or North had returned and taken most of the dreamsnakes away. Snake tied the cloth shut with one strip of material, and tied the whole thing to her belt with the other, leaving a long tether.

Something tickled her bare foot. She looked down and saw the eggling dreamsnake gliding away. Bending down, she picked it up, gently so as not to startle it. The tiny serpent tasted the air with its three-pronged tongue, butted its nose against her palm, and flowed around her thumb. She slipped it into the breast pocket of her torn shirt, where she could feel it moving only a layer of material away. It was young enough to tame. The warmth of her body lulled it.

She returned to the far end of the crevasse, where the walls came together in a point. Wedging herself into the narrow space they formed, she leaned back and pressed her shoulders and her spine against the rock. The wound did not yet hurt more, but she did not know how much stress it could stand. Snake put her right foot against the opposite wall and pushed, bracing herself. Carefully, she placed her other foot on the wall and hung suspended between the two faces of the crevasse. She pushed with both feet, sliding her shoulders upward, pushing back and down with her hands. She slipped her feet a little higher and pushed again, creeping upward.

A pebble came free beneath her foot and she slid, falling sideways. She scratched at the wall, scrabbling to keep herself in position. Rock tore at her elbows and back. She slammed down on the tumbled floor, landing hard and badly. Struggling for breath, Snake tried to rise and then lay still. Down and up reversed and shimmered. When they finally steadied, she drew in a long breath and pushed herself to her feet again.

She had not, at least, fallen on the dreamsnakes. She put her hand to her pocket and felt the little one moving easily.

Gritting her teeth, Snake slid back into the fissure and pushed herself upward again. Rock scraped her back and her hands grew slippery with sweat. She kept herself going; she imagined being able to look over the edge of her prison and she imagined hard ground and horizons.

She heard a noise and froze.

The sound came again: footsteps, approaching.

Nearly sobbing with frustration, Snake slid back into the pit. Her back and her hands and feet scraped against stone and the noise was so loud that she was sure North would hear it. Snake flung herself to the ground, curling her body around the sack of dreamsnakes. She froze there, by

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shear will concealing the reflexive tremors of fatigue.

"Healer!" North said.

Snake did not move.

"Healer, wake up!"

She heard the scuff of a boot against stones. A shower of pebbles rained down on her, but still she did not move.

After an interminable time, North's footsteps receded again.

Snake moved only enough to put her hand over the pocket of her shirt. The eggling was, somehow, still all right; she could feel it moving slowly and calmly beneath her fingers. Her hand was shaking; she drew it away so it would not frighten her serpent.

She sat up all at once. Getting to her feet was slower and clumsier, but finally she stood at the end of the fissure. Without looking upward, Snake put one foot against the wall, braced herself, wedged herself in with her other foot, and started up again.

As she crept higher and higher, she could feel the cloth of her shirt shredding beneath her shoulders. The knotted headcloth rose from the ground and scraped up the wall beneath her. It started to swing; it was just heavy enough to disturb her balance. She stopped until the pendulum below slowed its oscillation. The tension in her leg muscles turned to pain, and she could hardly feel the rock against her feet. She did not know how near the top she was and she would not look.

She was higher than she had got before; here the walls of the pit gaped wider and it was harder for her to brace herself. With every tiny step she took up the wall she had to stretch her legs a little farther. Now she was held only by her shoulders, by her hands pushing hard against the rock, and by the balls of her feet. She could not keep going much longer. Beneath her right hand, the stone was wet with blood. She forced herself upward one last time.

Abruptly the back of her head slipped over the rim of the crevasse. The sharp change nearly destroyed her balance. She flailed out with her left arm, catching the edge of the pit with her elbow and then with her hand. Her body spun half-around and she snatched at the ground with her right hand. The wound in her shoulder stabbed pain to her fingertips. Her nails dug into the ground, slipped, held. She scrabbled for a toehold and somehow found one. She hung against the wall for a moment, gasping for breath. Just above her breast, in her pocket, squeezed but not quite crushed, the eggling dreamsnake squirmed unhappily.

With the last bit of strength in her arms, Snake heaved herself over the edge and lay panting on the horizontal surface, her feet and legs still dangling in the pit. She crawled the rest of the way out. The torn headcloth scraped over stone, the fabric stretching and fraying. Snake pulled it gently until the makeshift sack lay beside her. Only then, with one hand on the serpents and the other almost caressing the solid ground, could Snake look around and be sure that she had

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climbed out unobserved. For the moment, at least, she was free.

She unbuttoned her pocket and looked at the eggling, hardly believing it was unharmed. Rebuttoning her pocket, she took one of the baskets from the pile beside the crevasse and put the mature serpents in it. She slung it across her back, rose shakily to her feet, and started toward the tunnels circling the crater.

But she could not remember which one had let her in. It was opposite the single large refrigeration duct, but the crater was so large that any one of three exits might be the one she wanted.

Maybe it's better, Snake thought. Maybe they always go in through the same one and I'll get another that's deserted.

Or maybe no matter which one I take I'll meet someone, or maybe all the others lead to dead ends.

At random, Snake entered the leftmost tunnel of the three possibilities. The torches meant North's people must use it for something. But most of them had burned to stubs, and Snake crept through darkness from one vague, flickering point to another. Each new light had to be the tunnel's mouth, but each time she found another fading torch. The corridor stretched onward. However harried she had been before, however exhausted she was now, she knew the first tunnel had not been this long.

One more light, she thought. And then—?

At the next torch she stopped and turned around. Only blackness lay behind her. The other flames had gone out, or she had rounded a curve that blotted them from her view. She could not bring herself to backtrack.

She walked through a great deal of darkness before she saw the next light. She wanted it to be daylight, made bargains and bets with herself that it would be daylight, but knew it was merely another torch before she reached it. It had nearly died; it flickered to an ember. She could smell the acrid smoke of an ebbing flame.

When the next torch appeared she hardly noticed it. It did not cast enough light to help her make her way. Her shoulder hurt so much that she had to slide her hand beneath her belt and hug her arm in close against her body.

Suddenly she was standing on a hillside in daylight beneath the strange twisted trees. She looked around blankly, then stretched out her left hand and stroked rough tree bark. She touched a fragile leaf with her abraded, broken-nailed fingertip.

Snake wanted to sit down, laugh, rest, sleep. Instead, she turned right and followed the hillside around, hoping the long tunnel had not led her half the hill or half the dome away from North's camp. She could think of no other place to look for Melissa.

The trees thinned out into a clearing. Snake almost walked into it before she stopped herself and pulled back into the shadows. All the people she had seen with North, and more, lay sprawled on the ground, asleep:

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dreaming, Snake supposed. Most lay faceup with their heads thrown back, their throats exposed, revealing puncture marks and thin trickles of blood among many sets of scars. Snake looked from person to person, recognizing no one, until her search reached the other side of the clearing. There, touched by the shade of an alien tree, the crazy lay dreaming.

But North was not in the clearing, and Melissa was not there either.

A well-used trail led back into the forest. Snake followed it cautiously, ready to slip between the trees at any warning. But nothing happened. She could even hear the rustling of small animals or birds or indescribably alien beasts as she padded barefoot over the hard ground.

The trail ended just above the entrance to the first tunnel. There, next to a large basket, alone with a dreamsnake in his hands, sat North.

Snake watched him curiously. Holding the serpent behind the head so it could not strike, he stroked its smooth green scales. Snake had noticed that North had no throat-scars, but now the sleeves of his robe had fallen back and she could see quite clearly that his pale arms were unscarred too.

"Why don't you let it bite you?" Snake said on impulse.

Starting violently, North swung around and stared at Snake. He glanced quickly around the clearing.

"Everyone's asleep, North," Snake said.

"Come to me!" North shouted, but Snake did not obey his commanding voice, and no one at all answered.

"How did you get out?" North whispered. "I've killed healers. They were never magic. They were as easy to kill as any creature."

"Where's Melissa?"

"How did you get out?" he screamed.

Snake approached him without any idea what she would do. It was true that North was not strong, but right now she was not strong either. She stopped in front of him.

North thrust the dreamsnake toward her, as if it would frighten her or bind her with desire to his will. Snake reached out and stroked the serpent with the tip of her finger.

"Where's Melissa?"

"She's mine," he said. "She belongs here."

But his pale eyes, flicking sideways, betrayed him. Snake followed his gaze: to the huge basket, nearly as long as she was tall and half that deep. Snake went to it and lifted its lid.

She took one involuntary backward step, drawing in a long, angry, fearful breath. The basket was nearly filled with a solid mass of dreamsnakes. She swung back toward North, furious.

"How could you?"

"It was what she needed."

Snake turned her back on him and slowly, carefully began lifting dreamsnakes from the basket. There were so many of them she could not see Melissa, even as a vague shape.

North scrambled up. "What are you doing?

"You can't—"

He started after the freed serpents,

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but one of them raised itself to strike and North flinched back. Snake dropped two more serpents on the ground. North tried once again to capture a dreamsnake, but it struck at him and he nearly fell avoiding it. North abandoned the serpent and flung himself toward Snake, using his height to threaten her. But she held another pair of dreamsnakes out toward him and he stopped.

"You're afraid of them, aren't you, North?" She took one step toward him. He tried to stand firm but when Snake took a second step he backed abruptly away.

"Don't you accept your own advice?" She was angrier than she had ever been before: the sane part of her mind, driven deep, watched with shock how glad she was to be able to frighten him.

"Stay away—"

"Is that what Melissa said to you when you made your creatures bite her? Why should I have any pity for you when you had none for my daughter?"

"Someone has to stay awake—someone has to take care of the serpents while everyone else dreams."

"You have to keep them all under your control, you mean, so no one can diminish your power."

"I made them all happy. Why shouldn't they honor me? What gives you the right to say you're so much better?"

Snake stopped.

I never forced what I had to give on anyone, she thought. I never demanded that anyone treat me like a god. I never demanded payment. And I never tortured a child.

But, slowly, she lowered her hands and drew back the serpents. She had been guilty of arrogance, she had always been guilty of arrogance. Being honored and treated with deference pleased her as much as it pleased North. Was the difference between them truly of kind, or only of degree? Snake was not sure, but she knew that if she forced these two serpents on him, whatever differences there were between them would be meaningless.

"I don't want to hurt you, North. Just stay away from me. I'm going to take my daughter and go home."

His shoulders slumped. "Take her," he said. "Go."

Snake turned.

The dreamsnakes had begun to escape of their own accord now. One slithered over the basket's side and fell to the earth with a soft thud. Several more peered over, and gradually the weight of the whole mass of them bulged out the wicker and tilted the basket.

North rushed past Snake as the basket tipped over. The serpents squirmed out in a writhing pile.

But Melissa was not there.

North halted, staring at the empty basket and the dreamsnakes.

Snake grabbed him and pulled him around. "Where is she?"

"She was there! She couldn't have got away! She was dreaming." He gazed at Snake, blank-eyed. "And you were in the pit."

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Yet Melissa *had* got away. Somehow, her will had defeated North, the venom, the lure of forgetfulness. Snake looked around the camp, searching again, seeing everything but what she wished to see.

North moaned in frustration. He rushed around the camp, trying to frighten the dreamsnakes back toward the clearing, toward the tunnel, anywhere away from the tangled forest. He dragged the overturned basket toward them, then tried to use it as a huge scoop. The stiff wicker scraped across the ground, pinning one of the serpents and crushing it.

Snake cried out. Before she quite knew what she was doing she tore the basket from North's grasp and clumsily heaved it down the hill. It bounced and rolled, somehow avoiding trees and the scant underbrush. Before North took more than a few steps toward it, it vanished.

"You—!" North turned toward Snake, enraged. Holding her left hand around her wounded shoulder, she waited. The dreamsnakes were too far away to use against him; she could neither reach one of the free ones nor get one she had captured.

You fool, she thought. You had your chance to stop him and now it's too late.

North looked from her to the dreamsnakes and back, fury and fear mixed in his expression. With a cry he flung himself away from Snake and ran after the serpents. He grabbed up one, and another, but he had nowhere to put them. He took both in one hand and reached for a third.

Snake shrugged and turned away. She would let all North's creatures escape if she could, but finding Melissa was more important.

North grunted in pain, then, after a moment, he made a strange moaning sound of fear. Snake looked over her shoulder. All three captured serpents slid to the ground and away, while blood from the puncture-wounds on North's hand delicately spattered the ground.

"I can't . . ." he whispered. He fell to his knees and balanced rigidly. "I won't . . ." He crumpled forward and lay still.

By reflex, Snake almost went to him. But he was breathing. He was not hurt, not by such a gentle fall. And the venom of one dreamsnake, one that had no doubt bitten others today, could not have very much effect on a person his size. The effect would be a construct of his mind, as it had been with Snake.

She left him where he lay.

The crushed dreamsnake writhed in the center of the clearing. Snake stopped, stared dully down, then knelt beside it. She ended its pain, killing it as she had killed her dreamsnake Grass.

With the taste of its blood chill and salty on her lips, she fumbled for the strap of her small wicker basket and hoisted it across her shoulders. It did not occur to her to look for Melissa anywhere but on the trail leading down the hill.

The tangle-trees cast a deeper,

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darker shade than the first time Snake had passed between them, and the opening through them was narrower and lower. With chills on her back, Snake pushed herself as fast as she could go. The alien forest that surrounded her could harbor any sort of creature, from dreamsnakes to silent carnivores. Melissa was completely unprotected; she did not even have her knife anymore.

When Snake had begun to believe she was on the wrong trail, she reached the rock outcropping where the crazy had betrayed her. It was a long way between North's camp and the ledge, and Snake wondered how Melissa could have got this far.

Maybe she escaped and hid herself, Snake thought. Maybe she's still up near North's camp, sleeping, or dreaming . . . or dying.

She went a few steps farther, hesitated, decided, and plunged ahead.

Stretched out on the trail, her fingers digging into the ground to pull her even a little farther, Melissa lay unconscious just around the next turn. Snake ran to her, stumbled, fell to her knees beside her.

Snake gently turned her daughter over. Melissa did not move, and she was very limp and cold. Snake searched for a pulse, now thinking it was there, now certain it was not. Melissa was in deep shock, and Snake could do nothing for her here.

Melissa, my daughter, she thought, you tried so hard to keep your promise to me, and you nearly succeeded. I made promises to you, too, and they've all been broken. Please let me have another chance.

Awkwardly, forced to use her half-crippled right arm, Snake wrestled Melissa's small body up on her left shoulder. She staggered to her feet, nearly losing her balance. If she fell she did not think she could rise again. The trail stretched before her, and she knew how long it was.

Snake stared at the ground, at her bare feet moving on the trail. She did not dare look up to see how far she might have come, for she was afraid of how far she still had to go. She felt weaker with each step. Melissa was a limp, increasing weight. Even the basket of dreamsnakes seemed to grow heavier, though the knowledge that she had the creatures helped to keep her going.

I can go home now, she thought. I can go home without being dishonored. If I can just get home. If I can get to Squirrel. If I can get Melissa to camp. . . .

Then, followed by the tiger-pony and the gray mare, a small black horse burst through the trees on the far side of the meadow. Snake cursed in an instant of fury that one of North's people should return to him right now.

And then she saw Arevin.

Astonished, she was unable to move toward him or even speak. He swung down from his mount while the horse was still galloping; he ran to Snake, his robe swirling around him. She stared at him as if he were an apparition, for

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she was sure he must be, even when he stopped near enough to her to touch.

"Arevin?"

"What happened? Who did this to you? The crazy—"

"He's in the dome," she said. "With some others. They're no danger right now. It's Melissa, she's in shock. I have to get her back to camp. . . . Arevin, are you real?"

He lifted Melissa from her shoulder; he held Snake's daughter in one arm and supported Snake with the other.

"Yes, I'm real. I'm here."

He helped her across the meadow. When they reached the spot where her gear was piled, Arevin turned to lay Melissa down. Snake knelt by her serpent case and fumbled at the catch. She opened the medicine compartment shakily.

Arevin put his hand on her uninjured shoulder, his touch gentle.

"Let me tend your wound," he said.

"I'm all right," she said. "I will be. It's Melissa—" She glanced up at him and froze at the look in his eyes.

"Healer," he said, "Snake, my friend—"

She tried to stand up; he tried to restrain her.

"There's nothing to be done. Let me help you."

"Nothing to be done—!" She struggled to her feet.

"You're hurt," Arevin said desperately. "Seeing the child now will only hurt you more."

"Oh, gods," Snake said. Arevin still tried to hold her back. "Let go of me!" she cried. Arevin stepped away, startled. Snake did not stop to apologize. She could not allow anyone, even him, to protect her: that was too easy, too tempting.

Melissa lay in the deep shade of a pine tree. Snake knelt on the thick mat of brown needles. Behind her, Arevin remained standing. Snake took Melissa's cold, pale hand. The child did not move. Her fingernails were torn and broken from dragging her along the ground. She had tried so hard to keep her promise . . . She had kept her promises to Snake much better than Snake had kept her promises to Melissa. Snake leaned over her, smoothing her red hair back from the terrible scars. Snake's tears fell on Melissa's cheek.

"There's nothing to be done," Arevin said again. "Her pulse is gone."

"Shh," Snake whispered, still searching for a beat in Melissa's wrist, at her throat, now thinking she had found the pulse, now certain she had not.

"Snake, don't torture yourself like this. She's dead! She's cold!"

"She's alive." She knew he thought she was losing her mind with grief; he did not move, but stared sadly down at her. She turned toward him. "Help me, Arevin. Trust me. I've dreamed about you. I love you, I think. But Melissa is my daughter and my friend. I've got to try to save her."

The phantom pulse faintly touched her fingers. Melissa had been bitten so often . . . the metabolic increase

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brought on by the venom could not last indefinitely. Snake feared that instead of returning to normal it had fallen sharply to a level barely sustaining life. And mind, she hoped. Without help, Melissa would die of exhaustion, of hypothermia, almost as if she were dying of exposure.

"What should I do?" His tone was resigned, depressed.

"Help me move her."

Snake spread blankets on a wide flat rock that had soaked up the sunlight all day. She was clumsy with everything. Arevin picked Melissa up and laid her on the warm blanket. Leaving her daughter for a moment, Snake spilled her saddlebags out on the ground. She pushed the canteen, the paraffin stove, and the cook-pot toward Arevin, who watched her with troubled eyes. She had hardly had the chance to look at him.

"Heat some water, please, Arevin. Not too much." She cupped her hands together to indicate the amount. She grabbed the packet of sugar from the medicine compartment of the serpent case.

By Melissa's side again, Snake tried to rouse her. The pulse appeared, disappeared, returned.

It's there, Snake told herself. I'm not imagining it.

She scattered a pinch of sugar onto Melissa's tongue, hoping there was enough moisture to dissolve it. Snake dared not force her to drink; she might choke if the water went into her lungs. Time was short, but if Snake rushed she would kill her daughter as surely as North might have done. Every minute or so, as she waited for Arevin, she gave Melissa a few more grains of sugar.

Saying nothing, Arevin brought the steaming water. Snake put one more pinch of sugar on Melissa's tongue and handed Arevin the pouch. "Dissolve as much of this in there as you can." She chafed Melissa's hands and patted her cheek. "Melissa, dear, try to wake up. Just for a moment. Daughter, help me."

Melissa gave no response. But Snake felt the pulse, once, again, this time strong enough to make her sure. "Is that ready?"

Arevin swirled the hot water around in the pan: a bit too eagerly and some splashed on his hand. Alarmed, he looked at Snake.

"It's all right. It's sugar." She took the pan from him.

"Sugar!" He wiped his fingers on the grass.

"Melissa! Wake up, dear." Melissa's eyelids flickered. Snake caught her breath with relief.

"Melissa! You need to drink this."

Melissa's lips moved slightly.

"Don't try to talk yet." Snake held the small metal container to her daughter's mouth and let the thick sticky liquid flow in slowly, bit by bit, waiting until she was certain Melissa had swallowed each portion of the stimulant before she gave her any more.

"Gods . . ." Arevin said in wonder.

"Snake?" Melissa whispered.

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"I'm here, Melissa. We're safe. You're all right now." She felt like laughing and crying at the same time.

"I'm so cold."

"I know." She wrapped the blanket around Melissa's shoulders. That was safe, now that Melissa had the warm drink in her stomach, and the stimulant exploding energy into her blood.

"I didn't want to leave you there, but I promised . . . I was afraid that crazy would get Squirrel, I was afraid Mist and Sand would die. . . ."

Her last fears gone, Snake eased Melissa back on the warm rock. Nothing in Melissa's speech or words indicated brain damage; she had survived whole.

"Squirrel's here with us, and so are Mist and Sand. You can go back to sleep, and when you wake up everything will be fine." Melissa might have a headache for a day or so, depending on how sensitive she was to the stimulant. But she was alive, she was well.

"I tried to get away," Melissa said, not opening her eyes. "I kept going and going, but . . ."

"I'm very proud of you. No one could do what you did without being brave and strong."

The unscarred side of Melissa's mouth twisted into a half-smile, and then she was asleep. Snake shaded her face with a corner of the blanket.

"I would have sworn my life she was dead," Arevin said.

"She'll be all right," Snake said, telling herself more than Arevin. "Thank gods, she will be all right."

"Healer," Arevin said, "the child is safe. Think of yourself now."

The urgency that had possessed Snake until now was slowly draining away. She knew that soon she would have to take Melissa and Arevin out of North's territory so he could not avenge himself on them. But for a little while, at least, Arevin was right. They were safe.

He touched her left shoulder. His hand was just as she remembered it, gentle and strong. She shivered, troubled by the neutrality of his voice.

Arevin knelt on the ground beside her and poured water on a cloth to clean the crossbow wound. The pain of it was beginning to return, creeping through the curtain of adrenalin she had willed around it. Snake slid her right hand under her belt.

"How did you ever find us?"

"I had to find you," he said. "I went to the healers' station. I wanted to make them understand what happened. My friend, I don't think I succeeded. I told your teacher the fault was ours, but she would give me no message for you except that she wishes for you to go home."

Snake remembered what she had said to him, that she dreamed about him and loved him. There was no time to respond to those words then, but now he acted as if she had never said them. She wondered, with a great empty feeling of loss and regret, if she had misunderstood his feelings. She did not want more gratitude and guilt.

"Is that the reason you followed

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me?" she asked, now copying his neutrality to keep her voice steady.

"I . . . dreamed about you, too." He leaned toward her, forearms resting on his knees, hands outstretched. "I never exchanged names with another person."

Slowly, gladly, Snake slid her dirty, scarred left hand around his clean, dark-tanned right one.

He looked up at her. "After what my clan did—"

Wishing even more now that she was not hurt, Snake released his hand and reached into her pocket. The eggling dreamsnake coiled itself around her fingers. She brought it out and showed it to Arevin. Nodding toward the wicker basket, she said, "I have more in there, and I know how to let them breed."

He stared at it, then at her, in wonder. "Then—you did reach the city. They accepted you—"

"No," she said. "They sent me away." She glanced toward the broken dome. "I found dreamsnakes up there. But the city people haven't seen the last of healers. They owe me a debt, and I expect to make them pay it in knowledge." She let the eggling slip back into her pocket. It was growing used to her already; it would make a good healer's serpent.

"My people owe you a debt, too," Arevin said. "So far I've failed to repay it."

"You don't owe me anything!" Snake said. Then, more calmly, she said, "Arevin, if it hadn't been for your clan I never would have found out about the dome. We would have gone on begging the city people for dreamsnakes, and they would have gone on refusing us. And the healers would have continued unchanging until none of us were left. Now, if Melissa wants to be a healer she won't have to wonder if there'll be a dreamsnake waiting for her. So maybe I'm in as much debt to your people as you are to me."

He looked at her for a long time. "I think you make excuses for us."

Snake clenched her fist. "Is guilt all that can exist between us?" she cried.

"No!" Arevin said sharply. More quietly, as if surprised by his own outburst, he said, "At least, I've hoped for something more."

Relenting, Snake took his hand. "So have I." She kissed his palm.

Slowly, Arevin smiled. He leaned closer, and a moment later they were embracing each other.

"If we've owed each other, and repaid each other, our people can be friends," Arevin said. "And perhaps you and I have earned the time you once said we needed."

"We have," Snake said.

"I've learned new customs since I came to the mountains," Arevin said. "I want to take care of you while your shoulder mends. When you're well, I want to ask if there's anything else I can do for you."

Snake returned his smile; she knew they understood each other. "That's a question I've wanted to ask you, too," she said, and then she grinned. "Healers heal quickly, you know." ■

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TOO MUCH AT STEAK:
the virtues of man the carnivore

GARY D. DOUGLASS

● Recently this author overheard a woman explaining to a group of people the reasons that she had become a vegetarian. Beyond claiming that her present diet was healthier than one containing meat, she went on to say that she abhored the thought of killing other animals for food. The people listening agreed in general with this feeling of sympathy for those beasts we consume daily. Perhaps some of them even went on to abandon the now clearly barbarous habit of eating animal flesh. The whole exchange symbolized for the scientific mind the ease with which a fallacious school of thought becomes entrenched in our modern culture.

While it might seem a good and noble thing to express sorrow for the poor cow that lived only to become your hamburger, it is actually only the product of mistaken reasoning. To put it briefly, how many cows would be alive today if MacDonald's sold turkey-burgers?

But this could be called mere speculation. Let's look at the facts.

Consider the stegosaurus. In many ways this giant lizard of the distant past could have been considered a very good food animal. It was extremely dull-witted (a characteristic for which it could also have been considered a very good game-show host), moved relatively slowly, and yielded many thou-

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sands of pounds of meat. However, if we examine the facts a bit more closely we find that the meat had a very "slimy" texture. Consequently, when eaten on a hot-dog bun it was quite likely to slide out the back of the bun and fall to the floor.

Notice that the stegosaurus is extinct.

And this is not the only example.

Look at the passenger pigeon. At one time this and the buffalo were to be found in great abundance in this land. The passenger pigeon, however, tasted terrible when fried in the Colonel's secret herbs and spices. The buffalo has long been known as a source of food. Which survives today? (The more learned readers will recall that, at one time, the buffalo was in danger of extinction. This was because of the sudden availability of catsup—which was revolting on buffalo. Fortunately, A-1 sauce was developed and the animal was rescued from oblivion.)

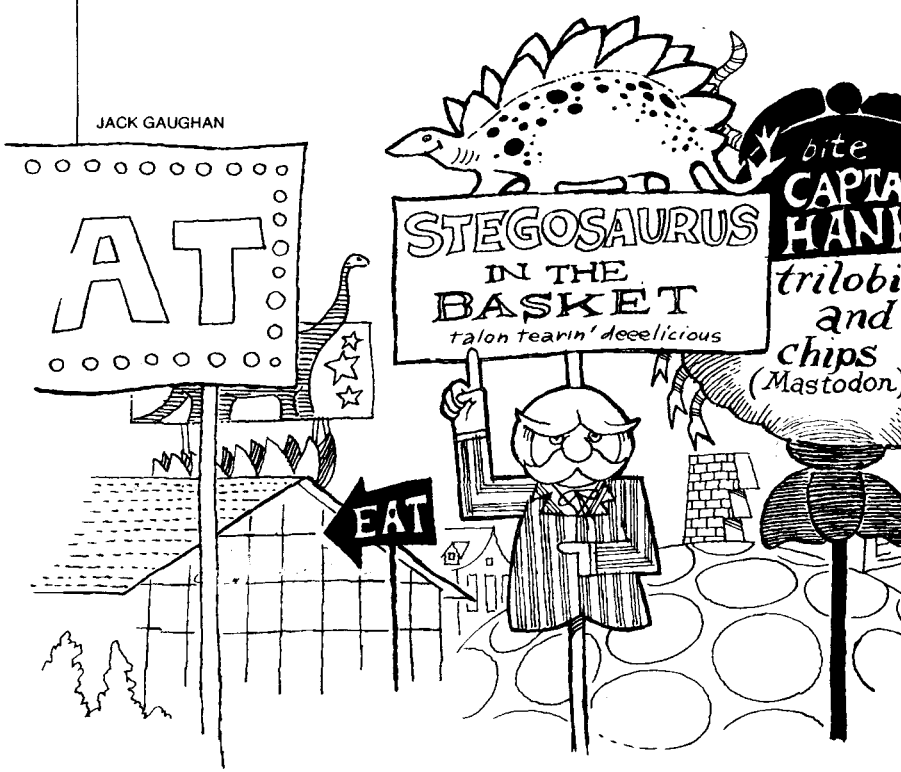
The list is endless.

What becomes crystal clear is the fact that food animals survive while others perish.

Where is the mighty tyrannosaurus rex, most terrifying of all the dinosaurs? He was too stringy and didn't go well at all with a baked potato.

Where is the roc? That giant bird of legend was too difficult to catch,

JACK GAUGHAN



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and tasted vaguely like a passenger pigeon anyway. (see above)

It is the law of the jungle. Survival of the tastiest.

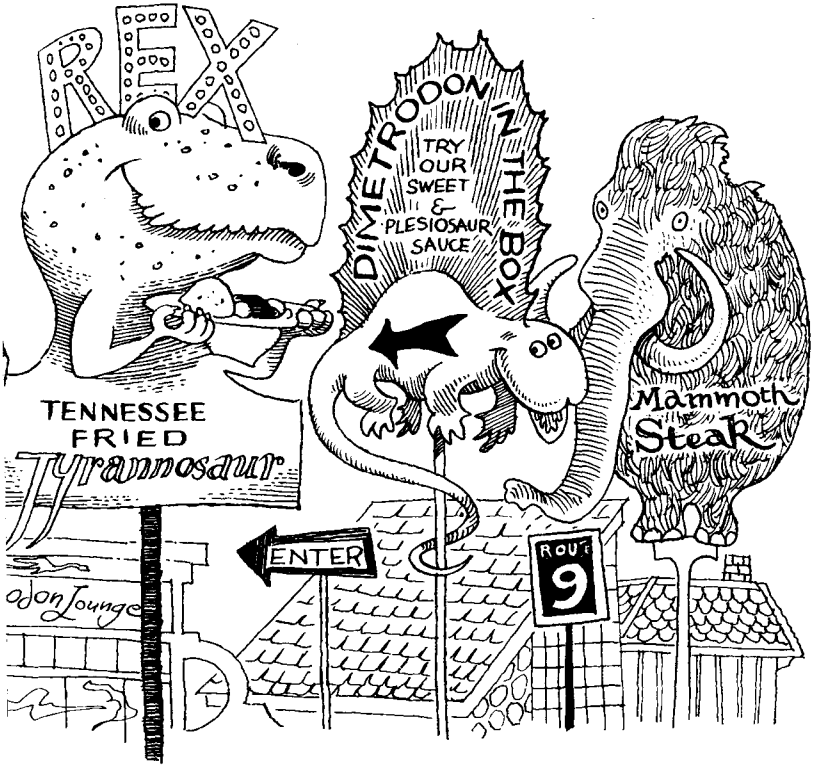
This widely accepted scientific observation was first set forth in Darwen's famous *Oregano on Species*. From this rose the general theory that all food originated from lower forms of food. Through natural selection, the tasty survived and evolved into even tastier creatures.

The obvious corollary we can derive from all this is: Any animal that is not a food source has its days numbered.

(You might object shouting, "What of aardvarks, wombats, and moles? What of cobras, porcupines, and hedgehogs?" But if you do it becomes obvious that you know little about French cooking).

Man has reportedly been given dominion over the Earth. He is the wielder of the knife and the fork, the microwave oven and the osterizer. One need only look around to see that any animal that does not serve one of man's purposes has its end in sight. Man stands at the top of this tangled food chain, and he makes the decisions. It is man who determines which species shall be slaughtered and eaten, and which shall perish.

And although man does not always show sound judgment, he invariably displays good taste. ●



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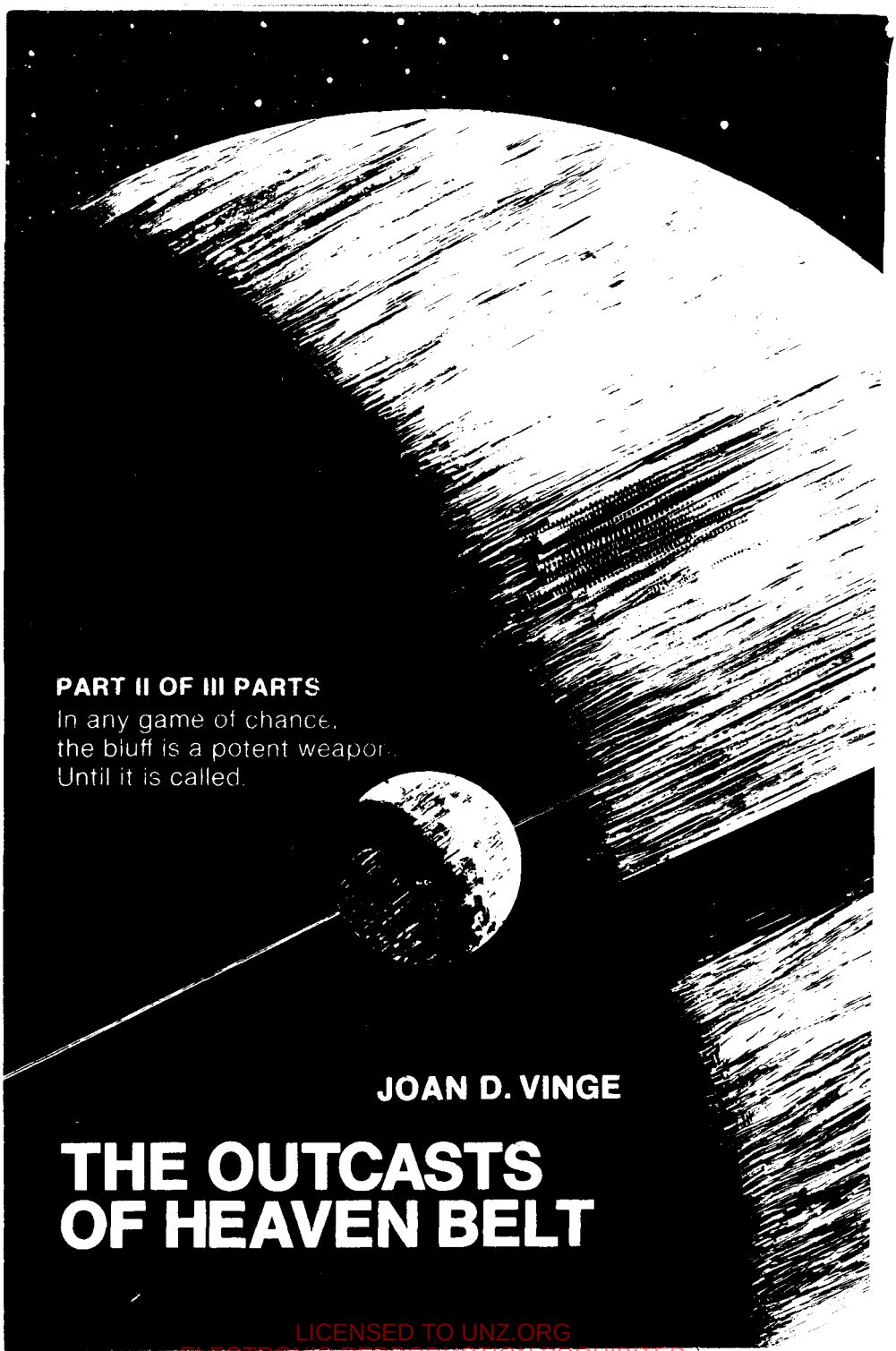

PART II OF III PARTS

In any game of chance,
the bluff is a potent weapon.
Until it is called.

JOAN D. VINGE

THE OUTCASTS OF HEAVEN BELT

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SYNOPSIS

Morningside is the bleak, innermost world of a red dwarf star, one of several marginal worlds in the same volume of space that have been colonized from Earth. The colonists of Morningside have a dream of Heaven: The Heaven system, which includes an asteroid belt, the Heaven Belt, also an Earth colony—but the colony that became the richest, most generous home mankind had ever found. Hoping to negotiate a share of Heaven's bounty, the Morningsiders have gambled their own most valuable resource, the starship Ranger, *on a trading mission to that system.*

After a journey of more than three light-years the Ranger *reaches the Heaven system at last—only to be attacked, near the ringed gas giant Discus, by four unknown ships powered by primitive chemical rockets. While escaping, the unarmed* Ranger *destroys one of the pursuing craft with its deadly exhaust—but only after the starship has taken a hit which kills five of the seven people who are its crew.*

Left suddenly alone with a ruined dream are the Ranger's *captain, Betha Torgussen, a 35-year-old engineer, and Clewell Welkin, the navigator, a 62-year-old astronomer. The senseless attack leaves them not only questioning the purpose of their mission, but also their own ability to continue: They were a part of a communal marriage, and the death of the crew was the death of their family, their husbands and wives. They want nothing more to do with Heaven; but to get the* Ranger *back to ramscoop speeds requires hydrogen, and they have to refuel. Betha decides to take the* Ranger *on in to the Main Belt capital of Lansing.*

In Lansing space they encounter another primitive, apparently crippled, spacecraft. This time Betha allows its two occupants to board the Ranger, *believing that an interview would be the quickest way to get some answers to the unknowns of this system.*

The reaction of the two strangers as they enter the control room is total incredulity—scavengers, they expected the ship to be a derelict they could salvage. Discovering that it isn't, they attempt to take it over instead. They are interrupted by Rusty, the ship's cat, who is to them a totally alien and unexpected creature.

Betha orders them out of their suits, and discovers that they are still in their teens: Shadow Jack, a sullen, hostile boy, and Bird Alyn, a shy, self-conscious girl with a misshapen hand. Unwillingly Betha is reminded of her own children, sound and happy, but unreachable, back on Morningside. Questioning the two, she learns at last what has happened to the Heaven the Morningsiders expected to find—it has been decimated by a civil war. Heaven Belt seemingly had everything that made Sol's asteroid belt successful, and more. But all those resources were available only to a high technology—and the Civil War

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destroyed the machinery of survival for Heaven's belters. There is no Earthlike world in this system to retreat to, not even one as marginal as Morningside—there is no escape. One hundred million people died because of the war, and the survivors now are only fading patches of snow. In the end, they will all be gone.

Shadow Jack tells her bitterly that their own planetoid, Lansing, has already reached the end, because its people have run out of the hydrogen they need to make water: Lansing, as the capital of the Heaven Belt, was a showplace—a self-contained ecosystem for the flora of Old Earth. But without water its fields and meadows are dying, and the people are dying with them. Lansing has nothing left to trade for hydrogen, and now they have no ships capable of taking a crew even as far as Discus, where they could try to steal what they need. The scavengers were sent out in an effort to find some salvage that will make the trip possible.

Betha and Clewell finally understand why they were attacked at Discus—and realize that their whole reason for coming to this sytem in the first place was meaningless. But they also recognize their own ignorance of the new situation—and that they share Lansing's need for hydrogen. Betha asks Shadow Jack and Bird Alyn to stay aboard the Ranger, *and trade their knowledge of the system for a share of whatever hydrogen they can get. The two agree.*

But in the meantime, the Ranger*'s entry into the system, and the Ringers' attack on it, have not gone unnoticed. In the trojan asteroids ahead of Discus, the Demarchy, an absolute democracy that still survives with a fairly high technology, has picked up the* Ranger*'s broadcast to the Ringers during their confrontation. Lige MacWong, an opportunistic official of the Demarchy's fragile and ineffective government, is convinced that possession of the starship could mean survival for Heaven—and for the Demarchy in particular. He guesses accurately that the* Ranger *will need to refuel, and hopes that after its treatment in the rings of Discus the crew will come to the Demarchy, the only other source of processed hydrogen. He gives all of this information in a briefing to Wadie Abdhiamal, a government negotiator, the man he thinks would be the most successful at dealing with the "alien" crew of the starship and giving the Demarchy the chance to get their hands on it.*

Wadie, thirty-eight and single, has spent his entire adult life working as a negotiator of disputes. Refusing to believe that Heaven is dying, he has convinced himself that his work creates a kind of binding force against the disintegration he can see progressing even here in the Demarchy. He is also one of the few demarchs who have spent time in the Grand Harmony of the Discan Rings: he kept peace between the collectivist Ringers and his own people while they built a distillery that would benefit both groups. He learned to see the

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Ringers' point of view, which is anathema to most demarchs; as a result he is both valued and suspect at home. He expresses doubts that the government can control what happens to the starship if they do manage to locate it, considering the extreme independence of the Demarchy's citizens, and the voraciousness of its fiercely competitive corporations.

But MacWong brushes off his questions and orders him to Mecca asteroid, a center for the Demarchy's distilleries, with the parting admonition: "We give the people what they think they want. Forget that and you're out of a job."

At the same time, in the Discan rings, the Grand Harmony is also dealing with the starship incident. Raul Nakamore, a Hand of Harmony—a high-ranking naval officer—has been summoned to a meeting where the top officials of the government are attempting to decide what further action should be taken, if any. Raul is in the trade faction of the government—unlike Wadie Abdhiamal, he long ago recognized that the Grand Harmony and all of Heaven are doomed: The Grand Harmony endures considerably more hardship already than the Demarchy does, and he feels that the government should not waste its dwindling resources on what he considers to be pointless defense measures against the Demarchy. He prefers to push for strengthening trade among the surviving planetoids around Discus, and even trading with the hostile Demarchy itself. But as the debate continues over the use of the Harmony's best chemical-powered ships to pursue the apparently damaged starship, he unexpectedly supports the "useless" project. The proposal is approved, and he is put in command of the Harmony ships as they begin their long journey to Lansing.

But Betha Torgussen, knowing none of this, has already taken the Ranger *to the fore trojans. She plans to trade with the Demarchy for hydrogen, posing as a Lansinger. Shadow Jack suggests that they offer the ship's cat as their item of trade, that the uniqueness of a living animal would appeal to a wealthy distillery owner. Betha agrees, over the protests of Bird Alyn and Clewell, and against her own feelings, believing that the cat is the only thing they could offer that won't reveal them as outsiders.*

Betha and Shadow Jack leave in the Lansing ship for Mecca, where the Demarchy's major distilleries are located, leaving Clewell and Bird Alyn behind with the Ranger. *Clewell sees Bird Alyn's unhappiness and realizes that she is in love with Shadow Jack. Wondering whether they will get what they need to survive, or whether they will ever see Betha and Shadow Jack again, he feels a sudden pain in his chest, and thinks, frightened,* Help me, God, I'm an old man. Don't let me be too old.

***Lansing 04* (Demarchy Space)**
+ 1.51 Megaseconds

"There it is," Shadow Jack said,

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almost a sigh. "Mecca rock."

Betha watched it come into view at the port: a fifty kilometer, potato-shaped lump of stone, scarred by nature's hand, and man's. Mecca's long axis pointed to the sun: the side nearest them lay in darkness, haloed by an eternal corona of sunglare. As they closed she began to see landing lights; and, between them, immense shining protrusions lit from below, throwing their shadows out to be lost in the shadow of the void. She identified them finally as storage tanks—enormous balloons of precious gases. *At last. . . .* She stirred in the narrow, dimly-lit space before the instruments, felt her numbed emotions stir and come alive. She filled her congested lungs with the dead, stale air, heard a fan go on somewhere behind her, clanking and ineffective; wondered whether she could ever revive a sense of smell mercifully long dead. It was small comfort to know that the claustrophobic misery of their journey would have been worse without the overhauling they had done on board the *Ranger*. Two strangers from Lansing could teach even Morningsiders something about toughness . . . The *Ranger* came back into her mind, and with it the galling knowledge that they could have crossed Demarchy space to Mecca in one day instead of fifteen, in perfect comfort . . . if things had been different. "But we're here. Thank God. And thanks to you, Shadow Jack. That was a good job." Her hand stroked his arm unthinkingly, in a gesture meant for someone else. He started out of his habitual glumness, looking embarrassed and then something more; reached to scan the radio frequencies. Static and voices broke across the cabin's clicking silence.

"Did—did you love one of them best?"

She sighed. "Yes . . . yes, I suppose I did. It's something you can't help feeling; I loved them all so much, but one. . . ." *Who isn't here, when I need him.* She shook her head, her eyes blurred, and sharpened again as a piece of the real world moved across them. "Out there, Shadow Jack." She leaned closer to the port, rubbed the fog of moisture from the glass. "A tanker coming in."

He peered past her, they saw the ship, still lit by the sun: a ponderous metallic tick, its plastic belly bloated with precious gases and clutched inside three legs of steel, booms for the ship's nuclear-electric rockets. "Look at the size of that! It must be comin' in from the Rings, they wouldn't use that on local hauls." He raised his head, following its downward arc. "Down there, that must be the docking field."

She could see the field clearly now, an unnatural gleaming smoothness in the artificial light, cluttered with cranes and ringed by more mechanical parasites, gorged and empty. Smaller craft moved above them, fireflies, showing red; sluggish tows in a profusion of makeshift incongruity. *Another world. . . .* She listened, watching, matching fragments of one-sided radio conversations with the movements of

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the slow-motion dance below them: boredom and sharp attention, an outburst of anger, unintelligible humor about an unseen technicality. "Shouldn't they be receiving our signal?"

He nodded. "They are. I guess they'll call us down when they feel like it."

Rusty stirred in the air above the control board, batted listlessly at the twined cord of his headset. "Poor Rusty," Betha murmured, reaching out. "Your trip in this sauna is almost over . . ." The rawness of her throat hurt her suddenly.

Shadow Jack twisted guiltily, stroked Rusty's rumpled fur. "Bird Alyn really let me have it for makin' you take Rusty away. She didn't want to lose her. She loves plants, makin' things grow—things that are alive . . ." His mouth twitched, almost a smile, almost sorrow. "I guess Rusty was about the most wonderful thing of all, to Bird Alyn."

"You miss her."

"Yeah, I . . . I mean, well, she's the only one who can really use the computer."

"Oh."

He glanced back at her, knowing what she hadn't said. "We just work together."

She nodded. "I thought maybe you—"

"No, we don't. We're not married."

She felt her mouth curve up in scandalized amusement. "I admire your self-restraint."

His blue and green eyes widened; she saw darkness settle across them again. "There's no point in wanting what we can't have. It's only keeping alive that matters—everybody keeping alive. If we can't get water for Lansing then it's the end, and it's stupid to pretend it's not. There's no point in . . . in . . ." He looked down at the control panel, "Those daydreamers! Why don't they answer us; what do they need, a miracle—?"

A voice broke from the speaker, "Unregistered ship—what the hell are you doing up there, running so dark?"

Shadow Jack turned back to her, speechless; she smiled. "Now try wishing for hydrogen."

Shadow Jack took them in, cursing in the glare, to a moorage on Mecca's day side. "'Not registered for main field.' Those nosy bastards! How come we couldn't land in the dark, like the rest of those damn charmed tankers." He stretched, leaning back, and cracked his knuckles.

"I suppose they don't want some tourist crashing into the distillery." Betha relaxed at last, at the reassuring sound of magnetic cables attaching to the hull outside.

He pushed himself away from his seat. "That doesn't help us. If something goes wrong, we'll have a hell of a time gettin' out of here this way." He moved toward the locker that held their spacesuits.

She sighed and nodded, reaching out to catch Rusty. "We'll just hope

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nothing goes wrong," thinking that whoever had named him for shadows had named him well.

Betha clung momentarily to the edge of the open air lock, looking down, and away, to where the world ended too suddenly: the foreshortened horizon, like the edge of a gleaming, pitted knife blade against the blackness. And beyond it the stars, scarcely visible, impossibly distant across the lightless void. She saw five torn bodies, falling away into that void where no hand could stop their fall, where no voice could ever break the silence of an eternity alone. . . . She swayed, giddy. Shadow Jack touched her back.

"Go on, push off." His voice crackled, distorted by his feeble speaker.

Behind his voice in her receiver she heard Rusty's fruitless scratching inside the pressurized carrying case; she saw figures coming toward them, moving along a mooring cable fastened amidships. She pushed herself out of the hatchway with too much force, drifted through a graceless arc to the ground. She began to rebound, caught at the mooring line and steadied herself. *A mistake.* . . . And she couldn't afford to make another one. She was dealing with Belters, and she'd damn well better act like the Belters did. She felt tension burn away the fog of her exhaustion, as she watched Shadow Jack land easily on the bright, pockmarked field of rubble behind her. Above him she saw the sun Heaven, a spiny diamond in the

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crown of night, frigid and far away—bizarre against the memory of her sun's bloody face in a dust-faded Morningside sky. As she turned away from the shadowed hull of the *Lansing 04* she could see other ships moored; the stark light etched the crude patchwork of misshapen forms on her mind, overlaying her memory of the *Ranger*'s ascetic perfection.

"You staying here long?"

She couldn't see the port man's face through the shielding mask of his helmet; she hoped her own faceplate hid her as well. "No longer than we have to."

"Good; your exterior radiation level's medium-high. Not good for the plants."

She looked down at the stained rubble, wondered if he was making a joke. She laughed, tentatively.

"You're the Lansing people—?" Eight or ten more figures spilled out from behind him, with bulky instruments she realized were cameras.

"What are you here for—?"

"Is it true that—"

"I thought everybody in the Main Belt was dead?"

She shifted Rusty's case, getting a better grip on the cable; their voices dinned inside her helmet. "We want to buy some hydrogen from your distillery." She looked back at the port man. "I hope we don't have to walk to the other side—?"

He laughed, this time. "Nope. Not if you're paying customers."

Betha noticed that he was armed.

". . . heard you Main Belters mostly scrounge and steal," the voices ran on, "have you really got somethin' there to trade for snow?"

"How is it that a woman's in your position; are you sterile—?"

"What's in the box?"

They surrounded her like wolves; she drew back, appalled. "I don't—"

"That's for us to know, junkers," Shadow Jack said suddenly. "We're not here for handouts, we don't have to take crap from any of you." He caught the guard's rigid sleeve. "Now, how do we get to the distillery?"

Betha's jaw tightened, but the guard raised his hands. "All right, you media boys, get off their backs. Take a picture of the ship; they didn't come from Lansing to pose for you. And be sure to mention Mecca Moorage Rentals. . . . No offense, buddy. Just follow the cable back to the shack; they're holdin' the car for you. Welcome to Mecca."

"Say, is it true that—"

Shadow Jack drifted over the cable and pushed past them to the far side. Betha followed, her motion painfully nonchalant. "Thanks—buddy," she said.

The guard nodded, or bowed, and so did Shadow Jack.

"Christ, who *were* those people . . .?" She glanced over her shoulder as they boarded the single canister car of the ground transport; behind them someone sealed the door. She heard Shadow Jack mutter, "Unreal." There were two others in the cabin, she saw, wishing it was empty, glad there were only two and hoping they didn't have

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cameras. Ahead through the plastic dome, the filament-fine monorail track stretched away over the barren brightness. Beyond the platform on her right she saw what looked to be a circular hatchway set into the surface of the rock; above it was a sign: HYDROPONICS CO-OP. She realized that the guard hadn't been making a joke; the chunk of naked stone that was Mecca was a self-sufficient world, riddled with tubes and vacuoles that supported life and all its processes. Too much radiation was bad for the plants. . . .

Her thoughts jarred and re-formed as gentle inertia pressed her against the seat-back. Rusty snuffled and scratched in the carrier, making a sound like static inside her helmet; suddenly, painfully, she remembered their destination, and their purpose. And that only Eric could help her now, but Eric was gone. "I wonder if this was built before the war?" She glanced at Shadow Jack's mirrored faceplate, needing an answer.

"Yes, it was." The voice in her helmet belonged to a stranger.

She started; so did Shadow Jack. They turned to look at the two others in the car; one, long legs stretching casually, reached up to clear his faceplate. "Eric—!" Her hand rose to her own helmet, hung motionless, almost weightless.

Curling dark hair, a lean, pensive face; the sudden smile that was almost a child's: The brown eyes looked surprised . . . amber eyes . . . not Eric, not . . . *Eric is dead.* She pulled down her trembling hand, leaving her faceplate dark. "I—I'm sorry. I thought . . . I thought you were someone I knew."

He smiled again, politely. "I don't think so."

"You're the ones who came to trade, from Lansing—" The second voice rasped like grit. "They said the car was waiting for you."

Betha winced, unseen. She looked across at the shorter, somehow bulkier figure; wondered if it was possible to find a fat Belter. Her own 1.75 meters felt oddly petite. The woman cleared her helmet glass, showed a middle-aged face, brown skin and graying hair, eyes of shining jet.

"Yes, we are." Betha kept her faceplate dark to hide her paleness, felt Shadow Jack fidget beside her.

"You're the first one's I've ever seen from the Main Belt. What's it like back in there? It's good to learn that you aren't all—"

Rusty emitted a piercing yowl of desolation, and Betha gasped as it rattled against her ears.

"My Lord, what was that?" The woman's gloves rose to her own shielded ears.

"Ghosts," Shadow Jack said, "of dead Belters."

The woman's face went blank with confusion. Betha glanced at the man, saw him smile and frown together; he met her unseen eyes. "Never heard a noise like that. Maybe we passed over a power cable." She realized that not only the cat, but the carrying case transmitter must be an unheard-of

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novelty in Heaven now.

The woman looked shaken. "I'm sorry. That wasn't gracious of me, anyway. Just that you're such a novelty. I'm Rinee Bohanian, of Bohanian Agroponics." She gestured at the sunside behind them. "Family business, you know."

"Wadie Abdhiamal." The man nodded. "I work for the Demarchy."

"Don't we all?" the woman said.

"The government."

She peered at him with a suspicion edging on dislike. "Well." She looked back at Betha. "And what's your name? You know, I'd like to get a look at a genuine spacewoman—"

"Betha Torgussen. I'm sorry, my helmet's broken." She crossed her fingers; no one showed surprise. "And this is—"

"Shadow Jack," Shadow Jack said. "I'm a pirate."

"Pilot," Betha murmured, irritated, but the others laughed.

"That's a Materialist name." The man was looking at Shadow Jack. "I haven't met one of those in a long time."

"Everybody's one, on Lansing. But it's just wishing. Nothin' left to contemplate." He was almost relaxing, the hard edge softening out of his voice.

The man glanced at Betha, questioning.

"Not 'everyone'." She turned away toward the front of the car, looking for a reason to stop talking. She heard the woman asking the man what he did for the government, didn't listen to his reply. They were nearing the terminator; it ran smoothly to meet them, like a cloud shadow crossing the broken desert lands of Morningside. Beyond the terminator, parallel to the edge of shadow, lay a line of leviathans: stubby poles of steel crowned by rings of copper, strung with serial blinking lights, red and green.

"That's the linear accelerator," the woman said. "It's used to ship cargo that doesn't have to move too fast, or go too far. . . . What exactly does a Materialist think?"

They crossed the terminator, blinking into night as though a switch had been thrown, and passed between the looming towers of the accelerator. The dark-haired man sat listening to Shadow Jack; unwillingly Betha felt her eyes drawn back to his face.

". . . and you're given a word, the name of somethin' material that's supposed to set each of you apart, and shape your being, somehow. Half the people don't even know what their words mean, now. . . ."

She watched the stranger in silence, helpless, flushed with sudden radiance, chilled until she trembled. . . . Remembering Morningside, the first days of her love for Eric, remembering an engineer and a social scientist ill-met in a factory yard on the Hotspot perimeter, and blazing metal in the unending heat of endless noon, remembering their last days on Morningside: A film of ice broken in a well in unending dusk, where the crackling edge of the darkside ice sheet, stained with rose and amber by the fires of

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sunset, shattered its mirror image in the Boreal Sea. Borealis Field, where her family, as the newly-chosen crew of the *Ranger*, worked together preparing for an emergency shipment, preparing themselves for the journey across 1.3 light-years to icebound Uhuru.

They had been selected from all the volunteers willing to leave homes and jobs because another world in their trade-ring needed help; but they had never imagined the journey that in the end would be assigned to them. Word had come from the High Council that a radio message had been received from Uhuru, and aid was no longer needed. They had been given a new, unexpected destination, the Heaven system, and a goal that was more than simple survival for another world or their own. She remembered the celebration, their pride at the honor, their families' pride, remembered Eric leading her quietly from the crowded, firebright hall, for one brief time alone before a journey that would last for years. His gentle hands, and the caressing heat of the deserted sauna; their laughing plunge into banked snow . . . the heat of passion, the wasting cold of death . . . fire and ice, fire and ice. . . . She cried silently, *Eric, don't betray me now. . . . Give me strength.*

The car slipped on through darkness.

The car drifted to a stop beneath the slender towers of their destination, among the ballooning storage sacs that glowed with ghostly foxfire—dim yellows, greens, and blues, excited by the ground lights into a strange phosphorescence. Betha shook off the past, looking out into the glowing forest of alien shapes. She heard the woman, ". . . how your Lansing fields are like our tank farmin'. Of course, there's no shortage of water for us; we have the snow stored below in the old mining cavities. We've got enough to last forever, I expect." A pride that was unconsciously greed filled her smile. The government man glanced at her; Betha saw him show quick anger, and wondered why. Shadow Jack pushed abruptly up out of his seat, stabilized himself instinctively. Tension tightened him like a wire again; she wondered what showed on his face.

They followed the man and woman through disembodied radio noise and the impersonal clutter of workers on the platform, came to another hatch set into the solidness of the surface rock. Below the air lock they entered tunnels that sloped steeply downward, without seeming to, into the heart of the stone. Betha felt her suit grow limp with the return of air pressure, making her movements easy. Sounds carried to her now, dimmed by her helmet, as she passed new clusters of citizens, some suited and some not, all mercifully oblivious; she wondered again at the behavior of the cameramen on the field.

They followed a rope along the wall of the main corridor, where the rough gloves of pressure suits had scraped a shallow trough along the pitted sur-

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face. Ahead and below she saw the tunnel's end, opening onto a space hung with fine netting. Curious, she drifted out onto the ledge at the chamber's lip.

"Oh . . ." Her breath was lost in a sigh. She stood as Shadow Jack already stood, transfixed by a faery beauty trapped in stone. Before them a vacuole opened up, a kilometer or more in diameter: an immense, unnatural geode filled with shining spines of crystal growth, blunt and spike-sharp, rainbow on rainbow of strident, flowing color. The hollow core of air was hung with gossamer, silken filaments spread by some incredible spider.

The images began to re-form in her mind; she realized that this was the city, the heart of life in the Mecca asteroid—that the crystal spines were its towers, reaching up from the floor, out on every side . . . down, from the ceiling. *Why don't they fall*? Her thoughts spun, falling; she felt someone's hands clutch her arms. Her mind settled, her feet settled softly on the ledge. Angrily she forced her eyes out again into the chamber's dizzying immensity. People drifted, as tiny as midgets, along the gossamer threads; light ropes, strung across the wide, soft spaces. The towers grew thickest, probing the inner air, on ceiling and floor, in the direct line of gravity's faint inexorable drag. The buildings that hugged the hollow's curving sides were shorter, stubbier, enduring greater stress. The towers shivered delicately in the slight stirring currents of ventilation; they were not solid crystalline surfaces, but trembling tents of colored fabric stretched over slender metal frames.

"It was a 'model city' before the War." She saw that the government man was the one who had caught her arms; he released her noncommittally. "It used to be a gamin' center. Now we play more practical games; most of those towers belong to merchant groups." The man unlatched his helmet, lifting it off and looking at her expectantly. "The air's okay here—"

She reached up only to switch on her outside speaker; her skin prickled, wanting the touch of his eyes. "Thank you . . ." she tried to sound unsure, "but I'll wait." Shadow Jack, speakerless, stood looking out into the city, sullenly content to play deaf and dumb. "Can you tell us which of those belongs to someone who can sell us hydrogen?"

"Hydrogen?" His wandering glance leaped back to her shielded face. "I thought you'd want air. Or water."

"We do. We need water—we have oxygen. So we need hydrogen; obviously." Rusty yowled; she closed her ears.

"Oh." His face relaxed into acceptance. "Obviously. . . . You know, it's not often that I meet a woman who's chosen to go into space. Is it common on Lansing?"

"Going into space isn't common on Lansing, any more." Betha remembered suddenly that the stranger's golden-brown eyes belonged to the enemy. "If you could just point out the distillery offices for me?"

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"Down there—" he pointed, "—that cluster of long greens on the floor; lot of offices for the distilleries in that bunch. Tiriki, Siamang . . ."

"Distilleries? There's more than one?" *Should I have known. . . .* She swore under her breath.

"Sure are." But he smiled, tolerantly. "This is the Demarchy, the people rule; we don't like monopolistic practices. It infringes on the people; they won't stand for it. . . . I know. Let me take you around."

"No, really—"

"It's the least I can do, when you've come this far." He put two fingers into his mouth and whistled shrilly, three times. She flinched; he turned back to her, surprising her with a quick, apologetic bow. "That's how you call a taxi here, now. Mecca's manners are going to hell. . . . Heaven is going to hell." He laughed oddly, as if he hadn't expected to say it out loud. "I'm from Toledo, myself."

"What—ah, did you say you do for the government?" She looked away uneasily across the ledge. The woman from the train had disappeared. *Why is he staying with us like this?*

"I'm a negotiator. I try to keep things from getting any more uncivilized than they already are." Again the quick, pained laugh. "I settle disputes, work out trade agreements, look into unexpected visits."

She almost turned, froze as she saw the cameramen from moorage emerge from the tunnel. "Shadow Jack!" She caught his arm. "Stay with me, don't get separated."

The voices closed in on them, ". . . in that run-down ship?"

"Who are you making your deal with?"

"How much—"

"What do you have—"

Mediamen and staring locals crowded them, ringed them in, jostling and interrupting. She saw the government man elbowed aside as the air taxi drifted up to the ledge, grating to a stop. She pushed toward it, gesturing to Shadow Jack. It was canopied and propeller driven, steered by hand by a bored-looking, well-dressed boy. "Where to?"

"To—to Tiriki's. And hurry." She ducked her head at the edge of the striped canopy, felt the footing bob beneath her in a sea of air, crystals reflecting above and below. Shadow Jack followed. The taxi sank outward and down, away from the grasping mob on the precipice.

"Torgussen!" She heard the government man shouting after her.

She looked back; her hands rose to her helmet, fumbling, pulled it off. She saw his face change with incredulity . . . recognition . . . loss. . . . *Stop it*! There was no resemblance, there could be no recognition . . . *Eric is dead*! She clung to a canopy pole, feeling the air currents stir her pale, snarled hair, soothe her burning face. *Oh, God, how often will this happen*? Shadow Jack hung over the edge, looking down, up, sideways, as they passed the artificial sun caged in glass suspended in the cavern's center. Slowly she sank onto a seat, forcing

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her own senses to absorb her surroundings, jamming the echoes of the past.

The cavern was filled with sound, merging and indistinct: laughter, shouting, the beehive hum of unseen mechanisms. She looked ahead, aware now of subtle differences of richness and elaboration among the massed towers; of balconies set at insane angles; of dark hollows in the bedrock walls, tunnels to exclusive homes. And gradually she became aware of the mingling of spices that perfumed the cool filtered air; she breathed deeply, tasting it, savoring it, easing her stuffy head. Unimpressed, the driver stared through her at the emerald pinnacle of their destination.

They pushed through the soft elastic mouth of the roof entrance, into a long empty corridor stretching twenty-five meters down to the building's base on rock. Betha began to sink toward it, almost imperceptably, and with no sensation of falling; they began to pass doorways. Shadow Jack unlatched his helmet, pulled it off and shook his head. She heard him take a deep breath. "Where are we?" His hair was plastered like streamers over his wet face; he wiped it back with a gloved hand.

"Tiriki Distillates. The man from the train suggested it." She hesitated, not wanting to tell him what she suspected.

"Bastards." His mouth pulled back. "I'd like to see this place blow up. They wouldn't be so—" Anger choked him.

Betha watched him, feeling sorrow edged with aggravation. She reached out, her glove pressed the soft, resistant covering on his shoulder. "I know how you feel . . . I know. But so did the people in that train car. Take the chip off your shoulder, right now, or I'll knock it off myself: I can't afford it. I want something from these people, and so do you, and it's a hell of a lot more important than what either one of us feels. So put a sweet smile on your face while we make this deal, and keep it there if it gags you." Somewhere the memory broke loose: " 'Smile and smile . . . and be a villain'." She smiled, breathing the cool scented air, and willed his eyes to meet hers. Slowly he raised his head; as he looked at her, for the first time, she saw him smile.

Someone pushed through a doorway almost at her side. He caught the flap, looking at her with frank disbelief.

She rubbed her unwashed face, embarrassed. "We'd like to negotiate for a load of hydrogen. Can you tell us who to see?"

A mask of propriety formed. "Of course. Sure. At the far end of the hall, the Purchasing Department. And thanks for doing business with Tiriki." He ducked his head formally and moved past them, pushing off from wall to wall, rising like a swimmer through the brightening sea-green light. They went on down, into the depths.

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"Look at this rag." They heard the voice before they reached the doorway. "What do they know about it? They don't know a damn thing."

"No, Esrom."

Betha brushed aside the flaps and they went in, wearing smiles rigid with tension.

"I could do better myself. That's what we ought to do, do it ourselves. We ought to hire some mediamen and put out our own paper—"

"Yes, Esrom."

"—tell them our side. Look here, Sia, 'monopolistic' . . ."

The golden-skinned, ethereally beautiful woman behind the counter looked up at them; her arching eyebrows rose. The golden-skinned, strikingly handsome man with the printout turned. *Brother and sister*, Betha thought, *and . . . impeccable*. They wore soft greens, colors flowing into a background of sea-green light, the woman in a long embroidered gown, the man in an embroidered jacket, lace at his sleeves. She pictured what they saw in return, brushed at her stringy hair.

But the man said, "Sia, did you ever see anything like that? Look at that skin, and hair, together. . . ." His dark eyes moved down her suit, identified it, looked back at her face. "But she's been in space." Interest faded to regret.

The woman tapped his arm. "Esrom, please!" She charmed them with a smile, "And what can we do for you?" She smoothed her sinuously drifting, raven-black hair along her back, tucked strands under her lacy cap.

"We'd like to buy a load of hydrogen from you." Betha felt herself blushing crimson while they watched in fascination. She tried to hide her annoyance. "One thousand tons."

"I see." The man nodded slowly, or bowed, looking vaguely surprised. He reached for a clipboard on a chain. "Do you want it shipped?"

"No, we can move it ourselves."

"Where are you coming from?" The woman's voice was as fragile as her face, but with no hint of softness.

"Lansing." Shadow Jack smiled, tall and thin and genuine, with one blue eye and one green.

"The Main Belt!" Brother and sister looked at them again; silent, this time, with a morbid awe. A newscast appeared on the screen behind them, flashing pictures between lines of print. "That's quite a trip," the man said quietly. "How long'd it take you?"

"A long time." Betha gestured up at worn, dirty faces, not needing to force the grating weariness into her voice. "And it'll be even longer going home. We'd like to get this settled as soon as we can."

"Of course." He hesitated. "What—er, what did you want to offer in trade? We're limited in what we can take, you understand . . ."

Charity begins at home. She saw Shadow Jack's rigid smile twitch, as she pulled off her gloves. *But who am I to blame them for that*? She balanced Rusty's carrying case against

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the metal counter top and unsealed the lid, hearing the hiss as the pressure equalized. Rusty's mottled head rose over the edge, her dilated pupils black with excitement, flashing green in the light. Her nose quivered and she wriggled free, rising up into the air like a piece of wind-borne down. Betha heard the small gasp of the woman, and let the case drift away. "Will you take a cat?"

"An animal," the woman whispered. "I never thought I'd ever see one. . . ." Shyly she put out a hand. Betha stroked Rusty, reassuring, pushed her toward them. Rusty butted softly up against the woman's palms, sniffing daintily, sidling in pleasure along the fine satin cloth of her sleeve.

"I think you've come to the right place." The man's slender hands quivered. "Dad would give you the whole distillery for that animal." He laughed. "But he'd make you pay shipping, in to the Main Belt."

"Are there many animals left on Lansing?"

"No." Betha smiled, felt it pull. "A load of hydrogen will be fine."

"We have gardens," Shadow Jack said. "Lansing's the only tent rock. We were the capital of all Heaven Belt, once." He lifted his head.

"Sure," the man said. "That's right, it was. I've seen pictures. Beautiful indeed . . ."

Rusty slipped away from the woman, began to jab a paw through the holes of a mesh container for papers. The papers danced and she began to purr, smugly content at the center of the world's attention. Betha's eyes were drawn away to the newscast on the wall; she froze as she saw her own face projected on the screen, realized it was not coverage of their arrival on Mecca. With all her will she glanced casually away, reaching out to scratch Rusty under the chin.

The man caught her motion, turned to look up at the screen. Her eyes leaped after him, saw her image vanish into lines of print. The man looked back at her, puzzled; shook his head, grimacing politely. "Don't mind the screen. We like to get the news from all over, to see what the competition's up to. It's all static anyhow, mediamen'll say anythin' they're paid for." He gestured at the printout settling gradually into a heap on the counter. Rusty pounced, overshooting, and swept it out into the air.

"Here, little thing, don't hurt yourself," the woman murmured, her hands tightening with indecision.

"She'll be all right," Betha said, irritable in her relief.

A small disapproval showed on the woman's face.

"Do you mind if we take a look at your ship?"

Betha looked back at the man. "No . . . but it's at the other end of the ast—of the rock."

He nodded. "Easy to do." There was a small control panel under the wall screen; he moved away toward it. "What's your designation?"

"*Lansing 04*."

He changed settings, the news re-

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port vanished. "*Lansing 04. . . .*" Betha saw their ship appear, an image in blinding contrasts on the sun-bleached field. "I guess it's possible for you to move a thousand tons with that ship. How much does it mass?"

"Twenty tons without reaction mass or cargo."

"We like to be sure, you know—" He looked up. "It's goin' to take you a lot of megasecs, though, to get back to Lansing."

She watched his face for unease, saw only his easy solicitude. "We'll manage; we have to."

"Sure." His eyes moved from her to Shadow Jack, touching them, she saw, with a kind of admiration. "We'll start processing your shipment."

Rusty crashed against the counter edge in a snarl of printouts and sneezed loudly.

"Hey, now." The man turned away, reaching for Rusty almost desperately. "Dad would kill us if somethin' happened to . . ." His voice faded, he let her go, catching up a sheet. Betha saw her own face on the page between his hands, not disappearing this time. ". . . alien starship . . ." She heard Shadow Jack's soft curse of defeat. She drifted, clutching the counter edge until her fingers reddened.

The Tirikis turned back to her. "It's you," the man said, staring. "You're from the starship."

"And you've come to us," said the woman.

An unconscious smile spread over their faces, the look of guileless greed Betha had seen on the woman in the shuttle. "I don't understand," she said stubbornly. "You've seen our ship; we've come from the Main Belt. There were a lot of people taking our pictures on the field . . ."

"Not that picture." The woman shook her head, her black hair rippling. Betha watched them remembering, reassessing. "We've heard about you ever since you came into the system over a megasec ago."

"And you didn't get from there to here in a megasec in the ship we saw." The man looked at Shadow Jack again, "You are from the Belt; maybe it's your ship. What are you, a snow pirate?"

"We're not pirating anything." Betha caught Rusty, pinned her against her suit. "We offered you a deal, this cat for a load of hydrogen. We've got nothing else that would interest you, wherever we're from. Just let us make the deal and go—"

"I'm sorry." The man looked down at the spiral of paper. "I'm afraid we *are* interested in a ship that can go from Discus . . . to the Main Belt . . . to the Demarchy . . ." Betha saw his mind work out the parameters, ". . . in one and a half megaseconds."

She wondered bleakly what he would think if he knew it had only taken a third of that. "What is it you want from us, then?" Knowing the answer, she knew now that she had failed, because there had never been a way to enter Mecca undetected—

"They want your ship! Let's get out of here." Shadow Jack pushed away

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toward the door, pulled aside the flaps, froze. Betha turned. Facing him, in a wine-red jacket flawlessly embroidered, was the man who worked for the government. Impeccable. . . . The man's eyes fixed on her in return, and on Shadow Jack. He stared, incredulous, and she knew that this time he was staring at wild, filthy hair and streaked faces. Not at her paleness . . . she knew from his eyes that her face held no surprises for him. "Captain Torgussen," he nodded. "And not from Lansing—obviously."

"You have the advantage of me," Betha said. "I'm afraid I've forgotten your name."

He smiled. It hardened as he turned to the Tirikis, making a bow. "And just what *does* Tiriki Distillates want with the starship?" His hand found the front of Shadow Jack's suit, pushed him back into the room: "I guess you weren't kidding, boy, when you told us what you do for a living."

"Who are you?" the woman asked, indignant.

"Wadie Abdhiamal, representing the Demarchy government."

"Government?" The man made a face. "Then this is none of your business, Abdhiamal. Butt out before you get into trouble."

"That's monopolist talk, Tiriki. And I think you've got the ideas to go with it. I'm here on business—these people and their ship are what I came to Mecca to find. The government has claimed the ship in the name of all the people of the Demarchy."

"Your government claims don't hold air, Abdhiamal." The man glanced down at his reflection on the counter top, readjusting his soft beret. "You know you've got nothin' to back them up. We found these two first, and we're keeping them."

"Public opinion will back me up. Nobody's goin' to let Tiriki have total control of that ship. I'll call a public hearing—"

"Use my screen." The man pointed. "When we tell the people how the government has been goin' behind the Demarchy's back looking for the starship, they're not goin' to hear a word you say. You'll be out before you know what happened, and I mean out of everything."

"But you'll be out one starship, and that's all that matters to me. Set up a hearing."

The woman moved toward the wall screen.

"Just a damn minute!" Betha turned desperately, caught them all in a look. "Sixty seconds—one minute, where I come from—to mention some things you seem to have forgotten about my ship: One, it is *my* ship. And two, only I know where it is. And three, if you think you'll get it without my full cooperation, you're wrong. My crew will destroy it before they'll let it be taken—and that will destroy any ship that gets within three thousand kilometers of it." Shadow Jack came back to her side, his face questioning. The others were silent, waiting, their frustration and greed sucking at her like flames. "Now, then. You seem to have reached an impasse.

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But I came here to make a deal, and I'm still willing to make a deal—since I don't think I have any other choice. I doubt if you'll let us leave, in any case.

"So . . . suppose each of you tell me why you want my ship so much, and then I'll tell you who gets it. And it wouldn't hurt if you mention what's in it for me—" Rusty began to struggle, clawing for a foothold on her slick suiting. She saw Abdhiamal watch the cat, smile with irrelevent fascination before he met her gaze in turn. He didn't answer; waiting for the opposition, she thought. "Well?" She turned away, afraid of him, afraid of herself, afraid to let him see it.

The Tirikis spoke softly together. They faced her finally, beautiful and determined. "Your ship would build up our business—and revolutionize the Demarchy's trade. The way things stand we don't have all the snow we need where it's easy to get at; we have to go to the Rings, and it's a hard trip with nuclear-electric rockets. And the Ringers make it even harder, because they know we can't do anythin' that would threaten our allotments of gases. If we had your ship we wouldn't have to depend on them. Your ship would make the Demarchy a better place to live. You could continue to captain it, work for us. We'll pay you well. You'll be part of the richest, most powerful company in the Demarchy—"

"And when the Demarchy objects, that company will make your ship into superweapon, and take over." Abdhiamal held her eyes as he spoke.

She felt her eyelids flicker; he slipped out of focus as she shook her head, denying. "No one will use my ship as a weapon. Not even you, Abdhiamal, if that's why you want it."

"The government wants it so it won't become a weapon, and bring on a new civil war. God knows the old one's still killin' us. Somebody's got to see that the ship is used for the good of the whole Demarchy, and not turned against us. It could be the stimulus we need to revive the whole Belt, the technology you have on board . . . we might be able to duplicate your ramscoop, build our own, reestablish some kind of regular communication outside the Demarchy. You could help us—"

"Don't listen to him!" the woman said. "We're the government, we, the people. He's got no authority to do anythin'. You'd be torn apart by everybody who wants your ship. He can't protect you. Stay with us, we'll take care of you—" She lifted her hands. "You've got nowhere else to turn." Betha recognized the threat behind it.

"They'll take care of you, all right," Shadow Jack whispered. His gloved hand caught Betha's wrist, squeezing until it bruised, "Don't do it, Betha! They're all liars, you can't trust any of 'em."

"Shadow Jack." She turned slowly, her hand still locked in his, and touched him with her eyes. He let go; she saw the anger drain out of him, leaving his face empty. "What about

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the hydrogen—for Lansing?"

"We'll send them a shipment; whatever they need."

"And you?" She faced Abdhiamal again. "Is it true that your promises are worthless?"

"The government only does the Demarchy's pleasure. Why don't we ask the Demarchy? We'll call a general meeting, and let you tell them all about your ship. Tell everyone the location—but warn 'em too, to keep away—tell them what you told us. Then nobody will be at an advantage. I'll tell them what your ship could mean to all of them, to the whole Belt. Everybody will have a hand in decidin' how to make the best use of the opportunity, the way things were designed to be done. . . . The Demarchy means you no harm, Captain. But we need your help. Give it to us, and you can name your own reward."

"Anything but a ticket home." Shadow Jack searched her face; she averted her eyes.

"All right." She reached down for Rusty's carrying case, forced herself to look at Abdhiamal again. "Abdhiamal, I'll try it your way. . . ."

He smiled, and she couldn't see behind it; she fought the desire to trust him. "Thanks." He turned to the Tirikis, "Set up a meeting."

"No. Wait." Betha shook her head. "Not here. I want to be on my ship when I make the announcement. If everyone has to know where it is, some lunatic will try to take it no matter what I say. I have to be there, to countermand my orders; I don't want to lose my ship now. I'm sure you don't, either?" She looked back at him. "We'll take you to the ship; we can broadcast from there. . . . After all, it's not going to get away from you without fuel, is it?"

"I suppose not. And I suppose you're right." He nodded once, watching the Tirikis. "Okay, I'll accept your terms."

"Go with 'em, Abdhiamal." Esrom Tiriki's voice mocked him. "That'll give us plenty of time to spread the news of this; the mediamen will tear you apart. By the time you call a meetin' you'll be public enemy number one. Nobody will listen to you then. You can count on it." His hand jerked at the counter's edge, chopping down.

She saw Abdhiamal's smile tighten. "Let's get goin', then."

She pushed Rusty, protesting, into the case and sealed the lid. She felt a small joy at a sacrifice refused, and felt the Tiriki's eyes change enviously behind her. She smiled faintly.

"How can you smile now, after what's happened?" Shadow Jack muttered. He picked up his helmet.

Softly she said, "Didn't I tell you there was always a reason to keep smiling?"

***Lansing 04* and *Ranger* (Demarchy Space) + 1.73 Megaseconds**

Wadie watched the starship grow on the screen in the cramped, stinking cabin of the *Lansing 04*. His admiration grew with it—and his heartfelt gratitude. This was the Ship from

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Outside, a ship to cross interstellar space at interstellar speeds, with a body streamlined to silken grace as a protection against the corroding particulate wind. It had none of the ugly angularity of the spacecraft he had always seen; it was pragmatic perfection, and there hadn't been a ship like it in the Heaven system in generations. The prewar starships of the Heaven Belt had been converted into the deadliest of war ships during the war—and had been destroyed, every one, just as the access to the basic requirements for life, the delicate balance of survival, had been destroyed. The Main Belt had become a vast mausoleum, and now the survivors were disappearing, like patches of melting snow. . . .

He looked down at the back of Shadow Jack's head. His own head ached insufferably; he looked back at the screen again, counting the seconds until they reached the ship. Even if it hadn't been all he imagined, still it would have been a haven, an escape from the past two hundred kilosecs of suffocating indignity in the foulness of this scrap-metal coffin. And an escape from the sullen, hostile boy and the small, blunt woman who might as well have been a man, like all the other women who pushed their way out into space. He watched her as she soothed the cat above the humming control board, the rings shining on her hands. He looked down at the silver and ruby ring on his own thumb, the gift of that other spacing woman and her man, and wondered wearily why this one bothered to wear so many rings, when she obviously wasn't interested in her appearance.

The starship's image blotted out the stars; unobtrusively, he used his water ration to clean his face and hands.

Not a ship. Wadie pulled back, halfway through the *Ranger*'s lock, as the room opened before him. *This is a world.*

"This is the control room." The captain moved past him, her voice husky in her hoarse throat; he heard the clanking as Shadow Jack still fumbled with a pressure suit in the lock behind him. He drew a long breath of cool air, coughed once as his startled lungs reacted.

"Hello, Pappy."

The captain pushed off from the wall, with the indefinable lack of grace that marked her alienness more than her face and hair. She moved across the vastness of the control room toward the instrument panels. He suddenly realized that the room was not empty, that he was being studied by a girl and a short pale-skinned man. "Betha—" A smile spread in the man's grizzled beard—an old man, too old to still be in space, to still be sound. The slim, brown girl wasn't looking at him at all, but only staring through him toward the lock. She was a Belter, ludicrously dressed in faded pants cinched by a flapping belt.

"You mean to tell me this is all you brought back?" The old man gestured at him, half-joking, half-appalled. "This—fop? You traded our Rusty for *this*?"

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The captain shook her head, amused, said blithely, "No, not 'Shadow Jack and the Beanstalk', Pappy. I just said we didn't get the golden goose . . . and maybe we've been the golden goose, all along, and didn't know it."

Wadie felt Shadow Jack brush by him with the cat in his arms. The boy tossed her out into the air, giving her momentum, and she paddled on across the room, perfectly at ease.

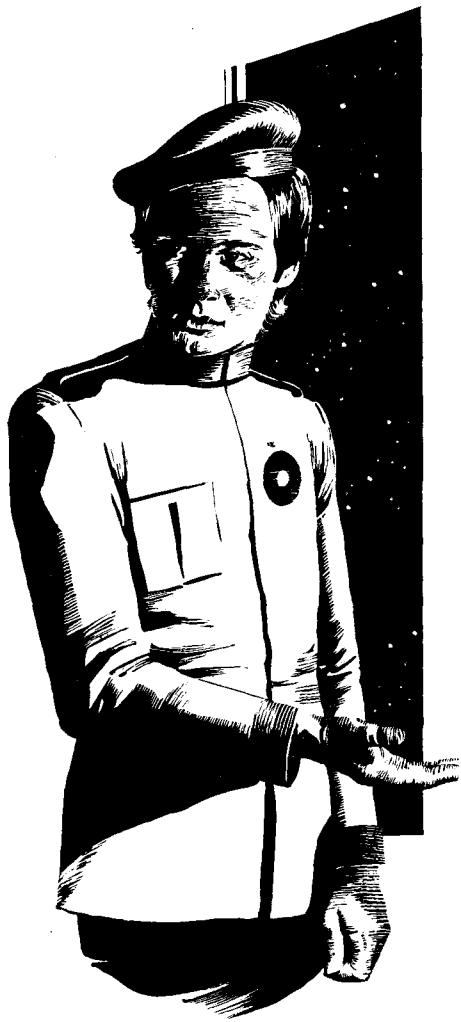
"Rusty!"

She made rusty meows of pleasure, moving toward the old man's familiar hands.

The Belter girl's face startled him, transformed by a wild bliss as her eyes found Shadow Jack. He looked away from her, back at the old man. "Wadie Abdhiamal, representin' the Demarchy. And usually better than this. I'm afraid two hundred kilosecs in that deathtrap didn't do much for my appearance." The old man laughed.

Shadow Jack glanced back at him. "Try it for a couple megasecs, sometimes."

The captain drifted against the control panel, lines of strain settling on her face again, making it grim. "It was hell, Pappy. I didn't want to make you come into Demarchy space to pick us up, but I don't know how much longer the life-support system would have held up. It wasn't adequate for two—and with three. . . ." She rubbed her face, smearing grime. "The past two days were worse than the whole two weeks going in. But we had to bring him along, it was the only way we



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could get out of there. Their communications network is incredible; they already knew everything about us—everyone did, on every single separate piece of rock. And every one of them just waiting to grab our ship and play God with it—just like the Ringers. We can't trust either of them now; if we want hydrogen we're going to have to take it."

"Captain Torgussen," Wadie said, "the government only wants—"

"I know what you want, Abdhiamal. My ship. You made it clear enough. But your Demarchy will have to catch us first." Her eyes cut him, blue glass. "I'm sorry, Abdhiamal, but you're on our ground now. Consider yourself our hostage."

Shadow Jack laughed, sitting back in the air; the girl moved away from the panel to his side, her face expressionless.

Wadie said nothing, saw the captain hesitate.

"You don't seem very surprised. You didn't believe what I told you at Mecca, and still you let this happen?"

"I didn't know whether to believe you or not. After what you've been through, I figured maybe you really had given orders for the destruction of your ship, and I didn't want to take that chance. And I didn't want to take any chances with the Tirikis. And if you were lying about cooperating . . . well, I'm on your ship; that gives me another chance to change your mind. Heaven Belt needs your help."

"We don't owe you anything; greed and hostility are all we've met in Heaven Belt."

"Why did you come here in the first place, except to trade on the fact that you figured we were ridin' high? Why shouldn't we be as greedy? One hundred million people—most of the Main Belt—died in the first hundred megasecs after the war. And the ones that are left—" He pointed at Shadow Jack and the girl. "Look at Lansing. Their people won't last another circuit around Heaven. And we're all headed for the same thing, unless we have your ship."

She frowned, hooked a shoe under the security rail that edged the panel. "The fact remains that we have rights of our own, as human beings—including the right to leave this system if we choose—and you're not willing to give them to us. It's true we came here to trade, because we thought Heaven had things we wanted. But you've got nothing to offer, and we can't afford to waste our ship and the rest of our lives for nothing. Morningside can't afford it. We just don't have the resources to throw away on you."

"I—admit we didn't consider your position . . ." He broke off, the crassness of it embarrassing him. "We made a mistake, not considerin' your position. It was a stupid mistake. But we aren't the Ringers; we don't just want your ship, we want your cooperation. We might still have some things you'd want. It wouldn't have to be forever; The use of your ship, its reactor, and its shop, for a hundred and fifty megasecs. We'll deal with you

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fairly." The part of him that had questioned MacWong asked, *Will we?* The Belter kids stared at him, distrustful, more in sympathy with outsiders than with a man from their own system.

The captain moved restlessly. "I don't believe that. Everything I've seen shows me I can't depend on the Demarchy. You can't even depend on each other. Even if you meant every word you said, someone else would make it a lie, and attack us. I'm not blind, Abdhiamal, I can see what's happened here, and I know it's true that you need help. If I'd only had some sign to prove to me that at least the Demarchy was worthy of our trust. But I haven't. We can't help you; you won't let us. It's impossible."

"Captain, I—"

"The matter is closed." Something in her voice told him that it was closed, irrevocably; and that the reason went much deeper than a simple betrayal of trust.

Not understanding, he only nodded, his own fatigue and exasperation leaving him defeated. "To what end am I your hostage then, Captain?"

Her eyes shifted, clouding. "I don't know. Whatever end we come to, for better or worse, will be yours too, I suppose. You helped us out of a tight spot, Abdhiamal. Inadvertently, but you did help us. I'll try to be as fair to you; if we get the hydrogen we need, I'll find a way to get you back to the Demarchy before we leave the system. It will only be a . . . temporary inconvenience." She looked at him strangely for a moment; turning away, she reached for the old man's arm. "Oh, Christ, Pappy, I'm so tired. So glad to be back." He pulled her close, too close; held her until she broke away, kissing him once, tenderly.

Old enough to be her father . . . surprise let a grimace of distaste pull his own mouth down; he covered it as they looked back at him. Only four, in this large, empty room; and two of them were Belters. Too empty. "Where's the rest of your crew?"

The old man glanced at the captain; she shook her head. "It doesn't matter, he'll find it out soon enough, I suppose." Her hand gestured at the screen, and knotted into a fist. "They all died, at Discus. And we're going back. Pappy, get started on a course for Discus, we can't risk staying here any longer. We're going to take what we need from the Ringers, Abdhiamal, any way we can, and that's going to suit me fine." She threw it at him, defiant, before she turned to Shadow Jack and the girl. "I'm going to get us out of here as fast as I can; I want to be sure no one from the Demarchy can touch us. We'll be doing one gee for five or six days, again, to get us back to the Rings . . ."

"It'll be worth it." Shadow Jack cracked his knuckles; the girl's mouth set in a line, she nodded. She moved closer to Shadow Jack, stroking his bare arm lightly. He glanced down at her hand, irritated, but didn't pull away. "Thirsty?" she said. He straightened out of his drifting slouch, smiled suddenly, wiping his hand across his

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the wall and they left the room.

The old man was strapped into a seat, working at the panel. The captain moved out into the air to collect a pencil and an unidentifiable metal cube. She pushed the cat into a compartment in the wall.

"Captain—"

She started back toward the control board. "What?"

"I'd like permission to use your radio."

"Refused." She reached a chair, maneuvered herself down.

"But I need to—"

"Refused." She turned her back, cutting him off as she began her work at the board. He waited, studying the tasteless combination of pale blue walls and green carpet. He noticed a stripe of deeper blue on the wall, an arrow, and the word DOWN.

"The Lansing ship is secure. Are the co-ords in, Pappy?"

"They're in. Ready when you are."

"Right. Ignition . . . thirty seconds. Feet on the ground, all of you!" The last of it went over an intercom, rattling off of walls through the empty heart of the ship. Wadie watched her hands move through a sequence on the panel, felt the light, familiar hand of gravity settle on his shoulders. And begin to bear down: His feet touched the floor, the drag against his legs continued, increasing past the point of familiarity, past the point of comfort. He backed up, caught hold of a bar along the wall, remembering thirty seconds of one gee on a Ringer ship, and realizing what it would be like for the next five hundred thousand seconds. Pain wrenched his muscles; the blue-on-blue streaked wall filled his vision, DOWN. His hands tightened, and he stood, enduring the pain, ignoring the heart that beat against his ribs like a fist.

He stood—and moved tentatively away from the wall, as the pressure bearing down on him stabilized. Dizziness made him sway, but he controlled it, balanced precariously as the captain and the old man rose from their seats. They looked toward him with expectant pity; the cat struggled out of the wall through a plastic porthole, made a circuit of his legs, licked his booted foot consolingly with her tongue. He folded his arms, looked down and back at them across the room. He smiled, blandly.

The captain turned and walked out of the room. The cat bounded after her, tail flying like a banner.

"Abdhiamal, is it?" The old man came over to him, held out a hand. "My name's Welkin, navigator on the *Ranger.*"

Wadie nodded, shook his hand, wondered at his motive in offering it. He noticed that Welkin's hand was bright with golden rings, like Betha Torgussen's; and that his grip was strong and firm . . . but the old man must be tough, if he could take one gee—ten meters per second squared, the gravity of Old Earth. This was what it had been like to live on Earth. A crash and Shadow Jack's pained, "Hell!" rose from somewhere below

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them. *No wonder we called this system Heaven.*

***Ranger* (In Transit, Demarchy to Discus) +2.25 Megaseconds**

Fifty kiloseconds later Wadie climbed the empty stairwell, one step and then another—wanting to crawl, and knowing there was no one to see it; but determined that he would keep control over something, if only his own dignity. He had investigated the lower levels of the ship's living area; the crew's quarters; the alien lushness of a hydroponics lab adapted to one gravity; the workshop—the last memory was almost a hunger. He had seen everything but the section on the second level, behind a sealed doorway where a warning light blinked red. And everywhere he had been stunned by the incredible waste—of water, of air, of living space—in a matrix of drab austerity that was primitive compared to the Demarchy's sophistication. He contemplated the irony in the idea that the Morningsiders considered themselves poor, when in some ways they were the richest people he had ever seen.

He reached the top of the stairs, leaned against the railing until his dizziness passed and his heartbeat slowed. His muscles ached dully when he stood, and when he moved pain burned in his trembling legs like a hot wire. He did his best to put his new clothes in order before he entered the control room.

The others were already there, watching something on the viewscreen. The captain and Welkin sat in chairs, Shadow Jack and the girl lay on the carpet, spreading their weight over the greatest area. The girl was trying to do pushups, her body rigid from the knees, as he looked in. He saw her elbows tremble, watched her collapse face down on the cushion. She lay spread-eagled on the floor, defeated. "I can't . . ."

"Then don't," Shadow Jack said, and more gently, "It'll be over soon, Bird Alyn; we don't have to get used to it." He flipped playing cards out into the air, watching their incredibly swift plummet to the rug. "Look who finally woke up." He looked back over his shoulder; the cat sidled past his head and sat down on the cards.

Wadie bowed casually, carefully keeping his balance. No one moved in return, and indignation rose in him until he remembered that he couldn't expect civility here. Pirates . . . he almost smiled, struck by the memory of what it had meant to be called a Belter, once, in the time when the only Asteroid Belt was Sol's. He studied the captain's face, clean now like her fair, cropped hair; met something in her eyes that startled him. She glanced down, lighting a pipe. The tangy sweetness of whatever burned stirred memories in him, instinctive, of things he had never seen.

"At least you're a likelier-looking trade this time," Welkin said.

Wadie looked down at the blue cotton work shirt, the blue denim pants that stopped ten centimeters short of his ankles. He had forced the

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pants neatly into his polished boots. The boots braced his legs, but weighted them down like lead. "At least I'm clean." He stepped carefully over the door sill and crossed the room, holding his head up, back straight. He reached the nearest swivel seat and lowered himself into it, leaned back easily, breathing again. The girl stared up at him, awed. Shadow Jack looked away with a frown; he muttered and pushed the cat, scattering cards.

"Captain . . ." Wadie turned in his seat, reordering his arguments. He stopped, as he realized what they had been watching on the screen. "You've been monitoring Demarchy communications?" Six separate images showed on the bright screen, each one a different broadcast frequency. He recognized a general newscast, three corporation hypes, two local arbitration debates.

The captain nodded. "It's been—enlightening."

"Has there been anything about your ship from the Tirikis?"

"Yes, news items; and there was a—"

She glanced back at the screen, as two of the broadcast segments suddenly disappeared, replaced by an octagonal star caught in a golden paisley, on a field of black. As they watched, the symbol blotted out the rest of the segments one by one. "What is this, Abdhiamal?"

"It's a call for a general meeting; any demarch who wants to participate can monitor the final debate, startin' now, and vote on the issues involved." He remembered uneasily that it had been two hundred and fifty kiloseconds since they had left Mecca, more than two hundred and fifty kilosecs since his last report. "I expect this'll be the debate about your ship, and what happened at Mecca. The Tirikis started to promo the second we left the rock; and nobody's heard a word from me. I'd like to monitor the debate. And I'd like the chance to defend myself, if you'll give me an open channel."

She put her pipe aside. "All right, I'll monitor the meeting. You can listen; but I can't let you speak."

"Why not? Your ship's clear. And they can track you by your exhaust, they don't need a radio fix—"

"I don't need you telling them our plans. I'd rather let them guess."

"Captain, I need to talk to them. This meetin' could mean my job." They all looked at him, unresponsive. He swallowed his irritation. "You—experienced the communications network we've got; it's from before the war, and it still works like it should. It's what makes the Demarchy work—every demarch's got equal priority on it, and anybody with a gripe about anythin' can broadcast it. Everybody who's involved or interested can debate. If they need to, they take a general vote, and the vote is law."

"Mob rule?" Welkin said. "The tyranny of the majority."

"No." He gestured at the slender golden teardrop on the screen, symbol of the 140,000,000-kilometer teardrop

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distribution of the trojan asteroids. "Not here. You can't get a mob together across millions of kilometers of space. It keeps the voters' self-interest confined to their own rock. They're independent as hell, and they're informed, and they judge. A jury of peers."

"Then why would you be worried about losing your job?"

"Because I'm not there to defend myself; the Tirikis can claim anything, and if nobody hears different from me what are they goin' to think, except that it's true. My boss will be answering them in my place, and he doesn't even know what's happened. If I can't tell them, I could take him down with me. The government floats on water, and if you rock the boat you drown."

The captain leaned forward, pressing her hands together. "I'm sorry, Abdhiamal, but you should have considered that before you came with me. I can't afford to let you speak now. Do you still want to listen in?"

He nodded. All the symbols but one were gone from the screen again; as he watched, the time-lag closed and the last one faded. The general meeting had begun.

". . . should already have put our fusion craft in pursuit." Wadie rested his neck against the seat back, as Lije MacWong's final argument drew to a close on the screen. *"We've done all we can to follow the wishes of the Demarchy. Too many things are still unclear to us, too, because we only know what you do. I'm a civil servant, no more, no less. If the people want to remove me for working in the people's interest, that's your privilege. But I don't feel that I've done anything to betray your trust."* A band of color showed at the bottom of the screen, slowly turning violet from blue; vote participation was eighty percent and rising.

Wadie watched the manicured brown hands fold on the gargoyled desk top, the pale compelling eyes that had challenged the Demarchy before, and won. They disappeared suddenly; the seconds passed. REBUTTAL: ESROM TIRIKI flashed on the screen. He felt his mouth tighten as Tiriki's serene, golden face appeared, eyes gleaming like metal. *"The fact remains that the . . ."*

The captain leaned back in her seat, fingers tapping soundlessly on the chair-arms. "He's one of the trolls, Pappy. Handsome, isn't he?" She looked up. "And out for our blood. How does it go, again? 'I smell the blood of an Englishman. Be he alive, or be he—dead . . .' " She broke off, took a deep breath. "Screw 'Jack and the Beanstalk'. What was that about fusion ships, Abdhiamal? I thought you said the Demarchy depended on fission power and fission-powered electric rockets?"

He nodded. "We have three small fusion craft left from before the war; they're our navy, if you want to call it that. But you've got a big lead on them. They couldn't catch you before you got to Discus."

"But it could give us less time to

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maneuver once we're there . . ."

". . . the government agent Abdhiamal threatened us, and kidnapped the Outsiders who had come to us to negotiate. Two hundred kilosecs have passed, without any further word from him. Their knowledge would have benefitted the entire Demarchy, it could have saved Heaven—but because of this 'government man' we've lost the crew and the starship forever. Consider that, when you make your final decision." The band of light below him showed an ever-deepening violet.

Wadie's hands tightened over nothing. FINAL REBUTTAL: LIJE MACWONG showed on the screen.

"I regret to say that, in honesty, I can't deny Demarch Tiriki's final accusation. Wadie Abdhiamal, a negotiator from my agency, has overstepped his authority to a degree I consider criminal. He has in the past been suspect of questionable loyalty, of known Ringer sympathies, and I frankly consider it possible that he intends to aid them in usin' that ship against us. I can only repeat that he was acting without my consent, or the consent of any other person in the government. This agency isn't, and never was, a party to these actions. He alone committed a crime, and like any other criminal, he should be found guilty . . ."

Wadie straightened, felt something grate in his neck.

". . . of treason against the Demarchy . . ."

"Lije!" he whispered, incredulous, willing the mahogany face to turn and the pale eyes to meet his own.

". . . And so, fellow demarchs, I want you to reconsider the basic issue before you make your decision: This should not be a simple vote of no confidence, against a government that's served you well; this is a judgment on the fate of the one man who has betrayed the hopes of us all. I ask for a bill of attainder against Wadie Abdhiamal, government negotiator, instead; for treason."

You bastard. He pushed himself up and moved through a nightmare to the panel.

"Let him never set foot on any territory of the Demarchy on pain of death. He has betrayed us all."

"Let me talk." He reached toward the banks of buttons.

The captain caught his arm. "No."

"I further urge again that all fusion-powered vessels be impressed into the pursuit of the alien ship; we must prevent it from reachin' our enemies. We must have that ship for ourselves!"

PROPOSITION flashed on the screen. BILL OF ATTAINDER AGAINST WADIE ABDHIAMAL, NEGOTIATOR. CHARGES: TREASON. PENALTY: DEATH. NEGATING PREVIOUS CHARGE: GOVERNMENT NEGLIGENCE.

He stepped back from the panel, his fingers twitching uselessly; his hand dropped. He went to his seat, sat down heavily, watching the ballots begin to register, APPROVE, OBJECT, numbers tallying with the passing seconds. Below them the percentage-of-voters

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band moved through red into orange into yellow. Five hundred seconds until it would reach full violet . . . five hundred seconds for the last votes to record from the outermost rocks of the trojans. An insignificant time-lag, by the standards of the prewar Belt, as 140,000,000 kilometers was an insignificant distance. Their closeness had meant survival for the trojans after the war; they meant death for him, now, letting men vote without hesitation, without reflection. He waited, the others waited with him, saying nothing. The ship's drive filled the silence with vibration, almost sound, almost intruding, the only constant in the sudden chaos of the universe.

PROPOSITION APPROVED. They found him guilty, twenty to one, and sentenced him to die. He watched the death order repeat, and merge, like a thing already forgotten, into a new cycle of debate over the use of fusion ships. He raised his leaden hands, let them drop again, smiled, looking back at the others. "Now I finally know how MacWong's kept his job for so long."

The captain cut off the debate, filling the screen with the void of his future.

"I guess I see the distinction between 'demarchy' and plain 'democracy'," Welkin said quietly.

"Welkin, you don't have the right to make any moral judgments about Heaven Belt."

"He's got the right," Shadow Jack said. He sat up, pulling his feet forward. "The crew of this ship, they were . . ." he fumbled for words, "were all married, they were a family; all of them together. And they all died in the Rings, except . . ." He glanced at Welkin and Betha Torgussen, back at Wadie, and down, twisting his fingers. "They all died."

Wadie watched the captain, her arm resting on the old man's shoulder. "I'm not married," he said, his voice flat. "And now I never will be." She looked back at him, not understanding, useless apology in her eyes, and a surprising sorrow. He got up, resenting the intrusion of her unexpected, and undesired, sympathy. "Well Captain, you've ruined your final opportunity for a constructive agreement with the Demarchy. For my own sake, I hope you have better luck with the Ringers than you did the last time." He went out of the room and down the spiraling stairs. No one followed.

***Ranger* (In Transit, Demarchy to Discus) +2.40 Megaseconds**

Betha sat alone at the control panel in the soothing semidarkness, gazing at the endless bright stream of Demarchy television traffic, soundless by her own choice, that still trailed after them, 200,000,000 kilometers out. Caught in a spell of hypnotic revulsion, she marveled at the perpetual motion of the Demarchy media machine, wondered how any citizen—demarch?—ever made a sane decision under the constant dinning of a hundred different distortions of the truth. And remembering the mediamen on

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the field at Mecca, she should have known enough to believe Wadie Abdhiamal, and let him speak.

She cut off the broadcasts abruptly, and put the crescent of Discus on the screen. She saw the *Ranger* in her mind, an infinitesimal mote, alone in the 500,000,000 kilometers of barren darkness, tracing back along Discus's path around the sun from the isolate swarm of rocks that were the Demarchy. She remembered then that they were not entirely alone: Expanding her mind's vision, she saw the Demarchy's grotesque, ponderous freighters loaded with ores or volatiles, crawling across the desolation; ships that took a hundred days to cross what the *Ranger* crossed in six. It was a barely bridgeable gap, now; and the survival of the Demarchy, and the Rings, depended on it. And someday there would be no ships.

But now, tracing the violet mist of the *Ranger*'s exhaust, she saw what might be three fusion craft, barely registering on the ship's most sensitive instruments.

She cursed the Demarchy, the obsessive veneer of sophistication, the artificial gaity, the pointless waste of their media broadcasts. Fools, reveling in their fanatical independence when they should all be working together; living on self-serving self-sufficiency, with no stable government to control them, no honest bonds of kinship, but only the equal selfishness of every other citizen. And their women; useless, frivolous, gaudy, the ultimate waste in a society that desperately needed every resource, including its human resources.

Fragments of conversation drew together in her mind, and she remembered suddenly what Clewell had said about crippled Bird Alyn. Perhaps in a sense they were a resource, sound and fertile women who had to be protected, in a society where radiation levels were always abnormally high; women who had let the protection grow into a way of life as artificial as everything else in their world. Perhaps the danger of genetic damage lay at the root of all the incomprehensible involutions of their sexual mores. Desperate people did desperate things; even the people of Morningside, in the beginning. . . .

She turned slightly in her seat, to glance at Shadow Jack lying asleep on the floor, lost in a peaceful dream, a book of Morningside landscapes open beside him. She wondered, if those were desperate measures for the Demarchy, what must be true for Lansing. Her hands met on the panel, caressing her rings, as Wadie Abdhiamal entered the room.

"Captain." He made the requisite bow. She nodded in return, watching him cross the room: the proper demarch, compulsively polite, compulsively immaculate. And as awkward as a child taking his first steps, moving in one gravity. His face looked haggard, showing the effects of stress and fluid loss. She remembered seeing him use his drinking water to wash his face on the *Lansing 04*, thinking that no one noticed. She brushed absently at her

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own hair. "Have you found everything you need, Abdhiamal? Have you eaten?" He had not joined the rest of them when they ate together in the dining hall.

He sat down. "Yes . . . somethin'. I don't know what." He looked vaguely *ill*, remembering. "I'm afraid I don't get along well with meat."

"How—are you feeling?"

"Homesick." He laughed, self-deprecatingly, as if it were a lie. He gazed at the empty screen. Rusty materialized on his knee, settled into his lap, tail muffling her nose. He stroked her back with a dark, meticulous hand; Betha noticed the massive silver ring on his thumb, inlaid with rubies.

"I'm sorry." She pulled her pipe out of the hip pocket of her jeans, quieting her hands with its carven familiarity.

"Don't be." He shifted and Rusty muttered querulously, tail flicking. "Because you were right, Captain; and I made the right choice in comin' with you. The Demarchy can't be allowed to take your ship; nobody in Heaven Belt can. I'm not saying that because of what happened to me—" Something in his voice told her that was not entirely true. "I've known all along, from the first time I heard about this ship, that it would make too many people want to play God." He looked up. "Even if it's not my right, I'd still turn your ship over to the Demarchy if I had the chance—if I thought it'd save them. But it wouldn't. The government *is* too weak, they'd never be able to keep an equilibrium now." His fingers dug into the soft arms of the chair; his face was expressionless. "So I'll tell you this. I'll help you get out of here, however I can. Anythin' I can do, anythin' you want to know. As my final service to the Demarchy: to buy them a little more time, and save them from themselves." His eyes went to Discus on the screen. "If I've got to be a traitor, I'll be a good one. I take pride in my work."

She broke away from tracing his every movement, her face hot. "If you really mean that, Abdhiamal . . . I want your help, whatever your personal motives. I need to know anything you can tell me about the Ringers—especially I need the number and the locations of their distilleries. No matter how primitive they are, it's going to take careful planning to steal anything from them with an unarmed starship. And as you say, I haven't done very well so far at getting what I want. Strategy was always Eric's—*was never my strong point.*"

"On the contrary. You out-negotiated us all, at Mecca." Irony acknowledged her with a smile. "I expect I can give you reasonably accurate coordinates; I spent lot of time in the Rings about two hundred and fifty megasecs ago, when we helped 'em enlarge their main distillery. As a matter of fact, I . . ." He broke off abruptly. "Tell me something about Morningside, Captain. Tell me about the way your people get things done. You don't seem to approve of our way."

She studied the words, trying to find the reason behind his change of

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subject; certain only that he didn't really want an answer, but simply a distraction. *And so do I.* "No, I can't say that I do approve, Abdhiamal. But that's the Demarchy's business; except when it gets in my way. I guess that you could say we emphasize our kinship—as fellow human beings, but especially as blood relatives. You already know about our multiple-marriage family unit." She glanced up, away; his eyes made no comment, but she sensed his uneasiness. "Above it is our 'clan'—not in the Old World technical sense, except that it tells you who you can't marry—your particular parent-family, your sibs, your own children. All your relations stretch out beyond it . . . almost to infinity, sometimes. We all try to take care of our own; everybody on Morningside has relations somewhere. Except that a person who isn't willing to share the work finds that even their own relations aren't glad to share the rewards, forever.

"The only formalized social structure above the clan level is what we call a 'moiety' . . ." She lost the sound of her own voice, and even the aching awareness of Abdhiamal's presence, in vivid memories that filled the spaces between her words with sudden yearning. Borealis moiety: an arbitrary economic unit for the distribution of goods and services. Borealis moiety: her home, her job, her family, her world . . . a laughing child—her daughter, or herself—falling back to make angel imprints in a bank of snow.

"Our industries are independently run, like yours are—but I suppose you'd call them 'monopolistic'. They cooperate, not for profits, but because they have to, or they'd fail. It works because we never have enough of anything, especially people. My parent family and a lot of my close relatives run a tree farm in the Borealis moiety . . . my wife Claire worked there too. Some families specialize in a trade, but Clewell and I, and our spouses, were a little of everything . . ." She remembered day's-end in the endless twilight, the family sitting down together at the long dark wood table, while their children served them dinner. The soothing warmth of the fire, the sunset that never faded from the skylight of a semisubterranean house. The small talk of the day's small triumphs, the comfortable fatigue . . . the welcome homecoming of a spouse whose job had kept him or her away for days or sometimes weeks. Eric, returning from the arbitration of a long-drawn dispute—

She saw Wadie Abdhiamal, sitting back in his chair, in the control room of the *Ranger*. A negotiator . . . *I settle disputes, work out trade agreements.* . . . Abdhiamal looked back at her with a faintly puzzled expression. She shook her head, *Stop it. Stop being a fool!* "I . . . I almost forgot—we have a High Council, too. It's a kind of parliament, made up of ombudsmen from the various moieties, elected to terms of service. It deals with what little interplanetary trade we manage, and the emergency ship-

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ments; it originated the proposal for our trip to Heaven. It doesn't have much to do with our daily lives—"

"Then in a way you are like us," Abdhiamal said, "without a strong centralized government, with emphasis on independence—"

"No," she shook her head again, denying more than the words. "We're like a family. We get things done through cooperation, not competition, the way the Demarchy does. Your system is a paradox: the individual has absolute control, and yet no control at all, if they don't fit in with the majority. We cooperate, and compromise, because we know we all need each other just to survive. And considering the position the Demarchy is in right now, I'd say it can hardly afford to go on putting self-interest above everything else, either."

Abdhiamal blinked, as if her words had struck him in the face. But he only shrugged, "Needless to say, we don't see ourselves in quite that light. I suppose your idea of cooperation is closer to the Ringers' Grand Harmony." There was no sarcasm in it. "They emphasize cooperation above all too, because they have to; they weren't as fortunate as the Demarchy, after the war. But they have a socialist state, and a strong navy, they get cooperation at the point of a gun. And that's no cooperation at all, really; that's why they're anathema, as far as the Demarchy's concerned. They don't trust individual human nature, even if it is backed up by family ties."

Betha struggled against a sudden, irrational resentment. "It's worked well enough so far. But then we don't kill any stranger who comes to us in need, either."

"Maybe you just never had a good enough reason, Captain."

She stiffened. Apology showed instantly on his face . . . and behind it, she saw a reflection of her own disorientation, the frustration of a stranger trapped in an alien universe. He was a man with no family . . . and now no friends, no world, no future. And she suspected that he was not a man who was used to making mistakes—or used to sharing a burden, or sharing a life . . . *not Eric.*

"I'm sorry, Captain. Please accept my apologies." Abdhiamal hesitated. "And—let me apologize for my tactlessness after the general meeting, as well."

"I understand—" She saw annoyance begin behind his eyes; stood up, not seeing it change into a kind of need. "If you'll excuse me . . ." she moved away, reaching for an excuse, an escape, "I—I have to see Clewell, down in the shop."

"You mind if I go with you?" His voice surprised her.

She hesitated, halfway across the room. "Well, I. . . : No, why should I?"

He rose, setting Rusty down. The cat leaped away, rumpled, moved across the room to where Shadow Jack still lay asleep, his face buried now in the pillow. Rusty settled on the softness beside his head, one speckled paw

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stretched protectively over his curled fingers.

"Poor Rusty." Betha glanced down. "She's been so lonely, since. . . . She was used to a lot of attention."

"She would have had all she wanted at Mecca."

"She would have been worshipped. It isn't the same."

She went down one level on the spiraling stairway, waited for him on the landing. He took each step with dignified deliberateness, his knees nearly buckling and his hand on the railing in a death-grip. He stopped with studied nonchalance beside her, peering down over the polished wood banister; the well dropped four more storys, piercing the hollow needle of the ship's hull. The concentric circles of a service hatch lay pooled at the bottom.

"It's good exercise." Betha stood against the wall, avoiding the sight of the drop.

He drew back with an innocuous smile. The doorway in the wall behind him was sealed shut, the red light flashing, throwing their shadows out into the pit. "What's behind this?" His hand brushed the door's icy surface.

"That was the dayroom. That's where we took the damage to our hull, and everyone died. It's not pressurized, please don't touch anything." She turned away from him, looking down at her hands. She went on down the stairs, leaving him behind to struggle on alone.

She reached the machine shop on the fourth level, heard the rasp of a handsaw. "Pappy!" She shouted, heard the echoes rattle around the hollow torus of the shop.

"Here, Betha!"

She traced the answering echoes, began to walk, the gum soles of her shoes squeaking faintly on the wood. The irregular clack of Abdhiamal's polished boots closed with her; she didn't look at him.

"Jesus, Pappy, why in the world don't you use the cutters to do that?"

Clewell looked up as they approached, on up at the nest of lasers above the work table. "Because it's a hobby."

"Which means you stand there for hours, breaking your back to do something you could punch in and get done in a minute."

"The impatience of youth." He leaned on the saw, the end split off of the wooden block and dropped. "Finished." His hand rose to his chest; seeing her watching, he lifted it further to rub his neck.

"Smartass." She looked pained, hands on hips. "I—uh, I thought you were going to check over my estimates on patching that hole in our hull?"

"I did that too. They look good to me. But we can't do anything about it now, while we're at one gee—" He looked at her oddly.

Abdhiamal stooped to pick up the splintered end of the block, rubbed its roughness, oblivious. "Say, what is this stuff? It's fibrous."

"It's wood. Organic. From the trunks of trees," Clewell said. "False-

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oak, to be exact. It's hard, but it whittles well."

"The floor, too? All plant fibers—wood?"

He nodded. "It's easier than turning it into plastic. False-oak grows two centimeters a day out by the Boreal Sea."

Abdhiamal's hand caressed the etched metal of the tabletop; he glanced up at the cutters and the suspended protective shield. "Lasers?" His hand closed, empty, as he searched the room, loosened to point at the wide doors cut into the hull, opening directly onto space . . . at the electromagnets set into the ceiling. She saw him answering his own unspoken questions. "And what's this equipment for, over here?"

Betha followed his hand, seeing in her mind red-haired Sean at work, dauntlessly clumsy; Nikolai patiently guiding. She looked away. "Repairing microcircuits on our electronics equipment."

"You have your own fusion power plant . . . you really could reproduce any part of this ship right here, couldn't you?"

"Theoretically. There are some I wouldn't want to try. This was a long trip, we had to be prepared for anything." *Except this.*

"God! If Park and Osuna could only see this place."

"Who?" Clewell removed the wood from a clamp.

"They're 'engineers'." Scorn lacerated the word.

"And what's wrong with engineers?" Betha folded her arms tightly against her stomach, raising her eyebrows.

"What's right with 'em?" Abdhiamal made an odd gesture. "They're a bunch of cannibals. They put patches on patches, they tear one thing apart and use the pieces to hold three more together, and then they tear apart one of those—"

"That sounds resourceful, to me."

"But they gloat about it! They think it's creation, but it's destruction. If they'd only *read* something, if only they had any imagination at all, they'd know what real creation is. The things we could do, once . . . nobody did them better. But that's like askin' for life in a vacuum."

"Or maybe you've just got your priorities wrong, Abdhiamal! What should they do, torture themselves over the past, because relics are all they have left to work with? At least they're doing something for their people, not living at the expense of everyone else, like some damned fop!" Betha jerked the piece of wood out of his hands, felt splinters cut her palm. She turned her back on his surprise, strode away through her echoing anger toward the door.

Clewell smiled at Abdhiamal's astonished face. "Abdhiamal, you just told it all to an engineer."

Abdhiamal winced. "I should never have gotten out of bed . . . two megaseconds ago." He stared out into the vastness of the empty room. "I always seem to say the wrong thing to

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. . . your wife. I thought she was a pilot."

Clewell listened to Betha's footsteps fade as she climbed the stairs. He wondered what fresh burden she had brought with her from Mecca—that showed in her eyes and her every action, and that she could not share even with him. "She was an engineer on Morningside, before she was chosen to captain the *Ranger* . . . parts of this ship are her design; she worked on its drive unit." He saw surprise again in Abdhiamal's tawny eyes. "It's the first starship we've had the resources to build since before the Low."

"Low?"

"Famine . . . emergency." Memories of past hardship and suffering rose in him too easily, drawn to the fresh memory of loss. A bruising weariness made him settle against the table's edge. He set aside the wood; morbidly picturing his own body as ancient wood, storm-battered, decaying. He sighed. "On Morningside small changes in solar activity, perturbations in our orbit, can mean disaster. When I was a boy—in the last quarter of my tenth year—we went into a 'hot spell' . . ." He saw the darkside ice sheet withdrawing, shattered bergs clogging the waters of the Boreal Sea. The sea itself had risen half a meter, flooding vital coastal industries; the crops had rotted in the fields from too much rainfall. He had watched one of his fathers kill a litter of kittens, because they had nothing to feed them. And he had cried, even though his own empty stomach ached with need. *Still, after all these years.* . . . "It took years for the climate to stabilize, most of my lifetime before our own lives got back to 'normal'. We've entered a High, right now, and Uhuru's stabilized—that's our closest neighbor; this flight was planned to send them aid, originally. That's why we took a chance on risking the *Ranger* to come here to Heaven." He felt the cutting edge of wind over snow, on the darkside glacier, where the sky glittered with stars like splintered ice. "That's why we can't afford to stay here. Even if we go back to Morningside empty-handed, at least they'll have the ship."

Abdhiamal nodded. "I see. I told—your wife, Captain Torgussen, that I'm willing to do all I can to help you get back to Morningside—for Heaven's own good. The way things seem to be goin', your remaining here is goin' to tear Heaven apart, not pull it back together again." For a moment Clewell was reminded of someone, but the image slipped away.

He considered Abdhiamal's words, surprised—more surprised to find that he believed them. *Have we found an honest man?*

Together we find courage,
Our song will never cease . . .

"What's that?" Abdhiamal said.

"Bird Alyn." Clewell heard the faint, halting music rise from the hydroponics lab. "Betha taught her some chords on the guitar; I taught her a few more songs, while we were—waiting." He heard Bird Alyn strike a sour note as she strummed. "I don't know if Claire would have approved,

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but the plants seem to appreciate her sincerity." He smiled. "It's not what you sing, or how, but how the singing makes you feel."

Abdhiamal smiled politely. His glance touched the scarred surface of the table, the floor, searched the room again; the smile grew taut. "You know, I sometimes have the strange feeling that I'm livin' in a dream; that somehow I've forgotten how to wake myself up . . ." a trace of desperation edged into his voice.

"Bird Alyn said the same thing to me. Except that I think she meant it."

"Comin' from the Main Belt, she probably did. Maybe I do too." Abdhiamal cleared his throat, an oddly embarrassed sound. "Welkin, I'd like to ask you a personal question. If you don't mind—"

Clewell laughed. "At my age I don't have much to hide. Go ahead."

Abdhiamal paused. "Do you find it—hard to take orders from your wife?"

Clewell straightened away from the table. "Why should that make a difference to me?"

Abdhiamal looked at him strangely. "Frankly I never met a woman I'd trust to make my decisions for me."

Clewell remembered what he had seen on the monitors of Demarchy society, saw why it might make a difference to Abdhiamal. "Betha Torgussen was chosen to command the *Ranger* because she was the best qualified, and the best at making fast decisions. We all agreed to the choice." He tightened the jaws of a table clamp, not sure whether he was amused or annoyed. "Answer me a personal question: What exactly do you think of my wife?" He watched an instinctive reaction rise up, and die away before it reached Abdhiamal's lips. *An honest man. . . .*

"I don't know." Abdhiamal frowned slightly, at nothing, at himself. "But I have to admit, she's made better decisions, since I've known her, than I have." He laughed once, looking away. "But then she chose space, instead of . . ." His eyes came back to Clewell; the frown, a confusion filled them again.

"Why doesn't the Demarchy have women in space? My impression of Belter life was always that everyone did as they damn well pleased. Men and women."

"Before the war, maybe. But now we have to protect our women."

"From what? Living?" Clewell picked up the piece of wood, shifted it from hand to hand, annoyance overriding amusement now.

"From radiation!" It was the first time he had heard Abdhiamal raise his voice. "From genetic damage. The fission units that power our ships and factories are just too dirty. In spite of everythin' we've done, the number of defective births is twenty times as high as it was before the war."

Clewell thought of Bird Alyn. "What about men?"

"We can preserve sperm. Not ova."

"You've lost more than you know,

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because of that war." Abdhiamal stood silently, expressionless; Clewell unstrapped the leather wristband that had been a parting gift from one of his sons, and held it out. "Do you recognize that symbol?" He pointed at the design enameled on a circle of copper, as Abdhiamal took it from his hand.

"*Yin* and *yang*?"

He nodded. "Do you know what it stands for?"

"No."

"It stands for Man and Woman. On Morningside, that means two equal halves merging into a perfect biological whole. A spot of white in the black, a spot of black in the white . . . to remind us that the genes of a man go into the creation of every woman, and the genes of a woman go into the creation of every man. We're not men and cattle, Abdhiamal, we're men and women. Our genes match; we're all human beings. It makes a lot of sense, when you stop to think about it."

"Odd—" Abdhiamal smiled again, noncommittal. "Somehow I didn't think *yin* and *yang* would have been a part of Morningside's cultural heritage."

"We all came from the same Old World, your people and ours, in the beginning. In the beginning *yin* and *yang* didn't mean much to us. We had a lot of symbols to separate us, then. We just need one now."

"*Yin* and *yang* and the Viking Queen . . ." Abdhiamal murmured; his smile turned rueful. "And Wadie in Wonderland. Why were there more men than women in your—family?"

Because it happened to work out that way. Clewell almost answered him with the truth. He paused. "Son, if you have to ask me why a marriage needs more men than women, you're younger than I thought you were." He grinned. "And it's not because I'm slowing down."

Abdhiamal drew back, disbelief ruffling his decorum. He held out the wristband.

Clewell shook his head. "Keep it. Wear it. Think about it, when you wonder why we're strangers to you."

Betha reentered the control room; Shadow Jack and Rusty still lay head-to-head on the grass-green rug. She moved quietly past them, sat down at the control board and pulled Discus into focus on the screen, a small silver crescent like a thumbnail moon. All that mattered now, and nothing else. She would get this ship home; this time they *would* succeed. Nothing must get in the way of her purpose, no man, living or dead, no memory. . . .

Her torn hand burned, she pressed it down on the cold panel, leaving a spot of blood. Her mind crossed three light-years and half a lifetime, to a factory yard on the Hotspot perimeter, where she had burned her hand on hot metal, inspecting the ideal made real. She had gone outside, to see her first engineering design passing in sequence on the assembly line—unbearably silver in the blinding noonlight, unbearably beautiful. She was in the third quarter of her twentieth year,

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fresh from the icy terminator: The golden rain of heat, the battering flow of parched desert air on this, the perimeter of total desolation, dazed her; pride filled her with exhilaration, and there was a certain student-worker. . . . She waited for him to stand beside her, and tell her that her design was beautiful. And then he would ask her . . . Rough gloves caught her arms and turned her back, "Hey, snowbird, you want to go blind?" She saw Eric van Helsing's adored, sunburned face laugh at her through the shield of his helmet, as she caught the padding of his insulated jacket. "They always said engineers were too quirky to come in out of the sun. You'd better go back—"

"For a social scientist, you haven't learned much about motivation, Eric van Helsing." Angry because he had ruined everything—and because, like a fool, she had waited for him—she pulled away, almost ran back across the endless gravel yard, escaping into the cool, dazzled darkness inside the nearest building. She stood still in the corridor, fighting tears, and heard him come through the doors behind her.

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You are the rain, my love, sweet water
Flowing in the desert of my life. . . .

Someone entered the room; Betha smelled the scent of apples. She looked for Claire's smooth moon-round face and golden tangled curls . . . found Bird Alyn again, thin and brown and branch-awkward: a dryad in a pink pullover shirt and blue jeans, with flowers in her hair. . . . Bird Alyn, not Claire, who tended hydroponics now.

Shadow Jack stirred as Bird Alyn dropped down beside him, her freckled cheeks blushing dusky-rose. Betha turned back to the screen, hiding her smile.

"Like some apples?"

"Oh . . . thanks, Bird Alyn." He laughed, self-conscious. "You always think of me."

She murmured something, questioning.

"What's the matter with you? No! How many times do I have to tell you that? Get out of here, leave me alone."

Pain knotted in Betha's stomach; she heard Bird Alyn climb to her feet and flee, stumbling on the doorsill. Betha turned in her seat to look at Shadow Jack; kneeling, he glared back at her as he pushed himself up.

"Maybe it's none of my business, Shadow Jack, but just what in hell is the matter with you?"

"There's nothin' the matter with me! You think everybody has to be like you? Everybody isn't, you're a bunch of dirty perverts!" His voice shook. "It makes me sick." He went out of the room, she heard him go down the steps too fast.

Betha sat very still, clutching the chair arms, wondering where she would find the strength to rise. Rusty sidled against her legs, *mrr*ing. Stiffly she reached down, drew the cat up into her lap; hanging on to meaning, to the promise of a time when Heaven would be no more than one of countless stars lost behind the twilight. "Rusty . . . you're all the things I count on. What would I have done, without you?" Rusty's rough, tiny tongue kissed the palm of her hand twice, in gentle affection. "Oh, Rusty," she whispered, "you make misers of us all." Betha got to her feet slowly, and looked toward the empty doorway.

Shadows moved silently over the tiles, moist and green, like the waters of a dream sea. Bird Alyn sobbed against the cold hexagonal tiles of the seat back, touched by the fragile fingers of a hanging fern. ". . . not fair, it's not fair . . ." that love was an endless torment, because it fed on dreams. That he would never touch her, never stroke her hair . . . never love her, and she would never stop wanting his love.

She heard him enter the lab, and the sob caught in her throat. She pushed herself up, eyes shut, wetness dripping off her chin.

"Don't cry, Bird Alyn. It wastes water." Shadow Jack stood before her,

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hands at his sides, watching her tears drip down.

She opened her eyes, saw him through lashes starred with teardrops, felt more tears rise defiantly. "We have . . . plenty of water, Shadow Jack." Misery coiled inside her, tightening like a drawn spring. "We're not on Lansing; everything's different here!"

His eyes denied it; he said nothing, frowning.

She turned away on the bench. "But I'm not . . . I know I'm not. Why did this happen to me . . . why am I so ugly, when I love you?"

He dropped down beside her on the seat; pulled her hands, one crippled and one perfect, down from her face. "Bird Alyn, you're not! You're not . . . you're beautiful." She saw her image in his eyes, and saw that it was true. "But—you can't love me."

"I can't help it . . . how can I help it?" She reached out, her wet fingers brushed his face. "I love you."

He caught her roughly, arms closing over her back, and pulled her against him. She struggled in surprise, but his mouth stopped her cry, and then her struggling. ". . . love you, Bird Alyn . . . since forever . . . don't you know?"

Her outflung hands rose to tighten on his shoulders, drawing him into her dreams, joy filled her like song. . . .

Let me blossom first for you,
Let me quench my thirst in you . . .

"No—" he pulled back suddenly, letting her go. He leaned against the cold tiles, gulping air. "No. No. We can't." His hands made fists.

"But . . . you love me . . ." Bird Alyn reached out, astonished by disappointment. "Why can't we? Please, Shadow Jack . . . please. I'm not afraid—"

"What do you want me to do, get you pregnant!"

She flinched, shaking her head. "It doesn't have to happen . . ."

"It does; you know that." He sagged forward. "Do you want to feel the baby growin' in you, and see it born . . . with no hands and no arms, or no legs, or no— To have to put it Out, like my mother did? We're defective! And I'll never let it happen to you, because of me."

"But it won't. Shadow Jack, everything's different, here on the ship. They have a pill, they never have to get pregnant. They'd let us . . ." She moved close, stroked the midnight blackness of his hair. "Even one pill lasts for a long time."

"And what about when they're gone?"

"We . . . we'd always have . . . memories. We'd know, we could remember how it felt, to touch, and kiss, and h-hold each other. . . ."

"How could I keep from touchin' you again, and kissin' you, and holdin' you, if I knew—?" His eyes closed over desperation. "I couldn't. If I was never going to see you again . . . but I will, I'd see you every day for the rest of my life, and how could I stop it, then? How could you? It would happen."

She shook her head, pleading, her

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face burning, hot hopeless tears burning her eyes.

"I can't let go, Bird Alyn. Not now. Not ever. I couldn't stand what it would do to me . . . what it would do to you. Why did we ever see this ship! Why did this happen to us. It was all right till—until—" His hands caught together, he cracked his knuckles.

Softly she put out her own hand, catching his; fingers twined brown into bronze. Because of this ship their world would live . . . and because of it, nothing would ever be right in their lives again. She heard water dripping, somewhere, like tears; a dead blossom fell between them, clicked on the sterile tiles.

Betha left the doorway quietly, as she had come, and silently climbed the stairs.

***Ranger* (Discan Space)**
+2.70 Megaseconds

Discus, a banded carnelian the size of a fist, set in a silver plane: The rings, almost edge-on, were a film of molten light streaked with lines of jet, spreading toward them on the screen. Wadie drifted in the center of the control room, keeping his thoughts focused on the silhouette that broke the foreground of splendor. Snows-of-Salvation, orbiting thirty Discus radii out, beyond the steep gradient depths of the gravity well. Snows-of-Salvation, that had been Bangkok on the prewar navigation charts, the major distillery for the Rings. It was one of five, but it outproduced the rest by better than ten to one; in part because its operations were powered by a nuclear battery constructed in the Demarchy, in part because it could send out shipments using a linear accelerator, also from the Demarchy but infinitely more useful here where transport distances were short. The Ringers' own primitive oxyhydrogen rockets made hopelessly inefficient tankers.

He remembered Snows-of-Salvation as it had been when he arrived with the Demarchy engineers: Endless grayness honeycombing the ice and stone; a chill that crept into a man's bones until he couldn't remember warmth; a small gray population, a people renting space in purgatory. A people fanatical to the point of insanity, in the eyes of the Demarchy. He had been sent to keep demarch and Ringer from each others' throats—sent because no one better qualified had been willing to go. He had stayed to see that two incompatible and suspicious groups never forgot their common goal of increasing the supply of volatiles. And in the fifty megaseconds he had spent in his grim and lonely exile, he had come to know a number of men he could only call friends, and had seen more of the Ringers' Grand Harmony than any other demarch. He had come to understand the chronically marginal life that existed for the Ringers everywhere; to see, almost painfully, what made them endure their oppressive collectivist ideology: The knowledge that they must always pull together or they would never survive.

The captain's voice drew him back.

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His eyes fixed on her where she hung before the viewscreen, her hair floating softly, free from gravity, her shirtsleeves rolled up to the elbow. He stared, the present an overlay on the past: the clean, colored warmth of the control room drove out a dreary poverty that made Morningside's plainness suddenly seem frivolous.

Morningside—could he ever have come to see its people as clearly as he had seen the Ringers? How long did it take to feel at ease with a people who offended your sense of propriety in every way imaginable? Whose behavior slipped through your attempts to catagorize it the way water slipped between your fingers. Four kilosecs ago he had come to the upper level to get himself some food, and found the captain and Welkin already in the dining hall, and Bird Alyn playing her guitar. They had all been singing; as though in four thousand seconds they were not going to commit an act of piracy, or face one more trial whose outcome meant freedom and life for all of them. . . .

Together we find courage,
Our song will never cease. . . .

Or perhaps, he had realized suddenly, they sang because they were much too aware, and afraid, of that fact. *Not what you sing, or how,* Welkin had said, *but how it makes you feel*— Suddenly aware of his own part in that coming trial, something stronger than curiosity had drawn him across the room to join them . . . only to have Betha Torgussen's face close and lose its warmth as she saw him; only to have her rise from the table, breaking the pattern of song, and abruptly leave the room.

"I can't believe this reading, Pappy . . . they should be frying down there, but they're not. There's no magnetosphere, no trapped radiation field. Do you know anything about this, Abdhiamal?" The captain glanced over her shoulder at him, not quite meeting his eyes.

He looked past her at the screen. "This is Heaven, after all, Captain. Discus's radiation fields are strong enough, but they don't reach much higher than the rings. That was one of the things that brought us to this system—the rocks and snowballs around Discus are accessible like they never were around Old Jupiter." He caught her eyes. "You don't seem very concerned about whether *we* were fryin'?"

"We make good shielding on Morningside, or we'd have fried long ago." She broke away, as she always did, now; looked up at Bird Alyn hanging near the ceiling above her head. "Bird Alyn, find the local talk frequency for me." Her voice was calm.

Bird Alyn nodded, braced against the ceiling and swooped down to the panel to catch up an earjack.

"Where's Shadow Jack?" Welkin asked.

Bird Alyn stared at the panel, said something inaudibly.

"What?"

". . . don't know . . . said . . . didn't think he could face . . ." She shrugged. The room filled with static

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as she switched on the receiver. The static slurred abruptly into words, the words sharpened as Bird Alyn locked them in. "Here . . ."

"What are they broadcasting?"

"They're talkin' to a ship, I think; a tanker . . . I heard 'hydrogen' . . ."

"Good—then let's rudely interrupt them." The captain reached for the broadcast button. "You're sure they'll know who we are, Abdhiamal?"

"I'm sure. Even the Ringers have had time to spread word of what happened to that ship by now. And if their propaganda is as extreme as it usually is, they'll expect you to be a butcher. They'll—respect your threat."

"All right." She wet her lips, pushed the button. "Snows-of-Salvation, Snows-of-Salvation, come in please . . ."

The speaker shrilled aggravation; Bird Alyn jerked the earjack away from her head.

"Who is that? Get the hell off this freq', there's a mixed-load dockin' in progress here! Do you—"

The captain's hand on the button cut him off. "Tell them to hold off, we have something more important to say to you."

"Who is this—?"

"This is . . ." she hesitated, "the ship your navy attacked two megaseconds ago . . . the ship from Outside." She released the button.

No answer came.

"You've impressed them." Wadie smiled, humorlessly.

A different voice came through, a voice that was strangely familiar to him, ordering the unseen tanker into a holding orbit. Welkin reached across the comm panel, by Bird Alyn's shoulder, and a new segment of the screen erupted into a blizzard of static snow. "We're receiving wideband—" He typed a sequence on the console; abruptly the screen showed a squeezed triple image. He punched in a correction, and a single black-and-white picture re-formed. They saw a pinched face squinting from behind wire-rimmed spectacles: a middle-aged man in a heavy, quilted jacket and a thick knit cap. "We're transmitting compatible now, too," Welkin said. The captain nodded, seeming to take the old man's skill for granted.

"What is it you want here?" The familiar voice matched a familiar face, harsh with anger, or fear. *With anger.* . . . Djem Nakamore was too stubborn and dogmatic to acknowledge anything else. Wadie pushed out of his line of sight as Nakamore glared at Betha Torgussen.

Her face hardened, staring Nakamore down. "We want one thousand tons of processed hydrogen, sent out on the trajectory I give you to our ship. If you fail to do this, I'll destroy your distillery, and you'll all die." The hardness seemed to come easily; Wadie felt surprise.

He watched their expressions change, the two strangers in the background showing real fear. Nakamore stiffened upright, drifting off-center on the screen.

"You won't destroy us. Even the

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Demarchy would want you dead if you did that."

"We're not from your system, you're nothing to us. The Demarchy is nothing. I hope you all go to hell together, for what you've done to us; but Snows-of-Salvation will get there first unless you obey my orders."

". . . they mean it . . ." a blurred voice said in the background. Nakamore turned away abruptly, cutting off sound. He spoke to the others, their eyes still flickering to the screen, faces tense, their breath frosting in the cold air as they spoke. Nakamore turned back to the panel, out of sight below him, punched the sound on. "We don't have a thousand tons of hydrogen on hand. We never have that much, and we just sent out a big shipment."

Wadie shook his head. "They'd never let the supply get that low. The throughput is nearly three thousand tons per megasec, and they have at least four times that as backlog, in case the distillery goes off-line for repairs."

The captain twisted to look at him, cutting off sound in return. "You're that familiar with their operation?"

He nodded. "I told you—I spent almost fifty million seconds down there, I saw that distillery put together, and saw it go into operation; I know what it can do. And I know that man . . ." He remembered Djem Nakamore's face, the bald head reddened by the light from a primitive methane-burning stove; remembered the amused face of Djem's visiting half-brother, Raul. He heard the hiss as water sweated from the ceiling to drop and steam on the stove's greasy surface, as he waited while Djem pondered his next painfully predictable move, that would lose him his hundredth, or his thousandth, game of chess to Wadie Abdhiamal. Stubborn, didactic, and unimaginative . . . honest, forthright, and dedicated to his duty. No match, as Djem had told him, often enough and without resentment, for Wadie's own quick and devious mind—yet too stubborn not to go on trying to win. Wadie adjusted the earflaps of his heavy hat, put out a hand to move his queen, *Checkmate*. . . . "I know that man. Push him; he's not—devious enough to know whether you're bluffin'. And he'll do anything to keep that distillery intact." He realized suddenly that it could have been Raul who faced them now instead, and was glad, for all their sakes, that it was not. He looked away as he spoke, avoiding the bright image on the screen, and Betha Torgussen's eyes.

The captain frowned slightly, then turned back to Nakamore on the screen. "I don't accept that. You have twenty-five thousand seconds to give us the hydrogen, or be destroyed."

"That's impossible! It would take at least a hundred thousand seconds."

"Lie," Wadie said softly, shook his head again. "He's stalling; Central Harmony keeps plenty of naval units in this volume, and he's hopin' some of 'em will get here in time."

Nodding, she repeated flatly, "You

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have twenty-five kiloseconds. I know you have a high performance linear accelerator down there. Use it. I don't want any manned vehicles to approach us. Copy coordinates—" She spoke the numbers carefully.

As she finished speaking Nakamore looked past her, angry and beaten, but little of it showing on his face. "Are you there, givin' her the answers, Wadie?"

Wadie hung motionless . . . speechless. He pushed away from the panel at last, out into Nakamore's view. "Yeah, Djem, it's me."

"We picked up the broadcast debates from the Demarchy—how they've outlawed you. I figured maybe you'd . . ." Nakamore's face set, with the righteous anger of a man to whom loyalty was everything; with the pain of a man betrayed by a friend. "We were fools not to see what you and your . . . starship aliens would try. Why stop with a thousand tons of hydrogen? Why not take it all?"

"One thousand tons of hydrogen is all we need, Djem. And we need it bad, or I wouldn't put you through this." Without fuel, the starship was trapped prey to the first group quick enough to take it. And then the Grand Harmony, and the Demarchy, and everyone else would be the prey. And then the threats would be no bluff. This was for the best; this was the only choice he could possibly make, the only sane choice. If he could only . . . He started, "Djem, I—" But no words would come.

Nakamore waited, his black eyes pitiless. At last he leaned forward, reaching for the unseen panel. "Traitor." His face disappeared; and the last chance of asylum for a banished man. Discus lay alone on the screen.

The captain sat gazing fixedly at the screen, her mouth pressed together, a brittle golden figurine. Welkin glanced at Wadie, apologetic but saying nothing, saving him from the embarrassment of a witty response that wouldn't come.

". . . think they'll do it?" Bird Alyn pulled at the flapping end of her belt. "What if they don't . . .?"

"They will." He found his voice, and his composure. "In fifty million seconds, Djem Nakamore never won a game of chess from me."

"You were perfect, Betha—" Welkin turned back, his faded eyes searching the captain's downturned face. "Eric couldn't have put it more convincingly."

"If Eric were alive, we wouldn't be doing this."

Wadie nodded, relieved. "I almost believed you meant every word of that, myself."

She struck a match. "What makes you think I didn't, Abdhiamal?" She lit her pipe, facing him with the same hardness that had faced down Snows-of-Salvation. "What have the Ringers done for us lately?"

"Indeed." He bowed grimly, looked back at Welkin. "I've learned my lesson—I'll never insult another engineer." He pushed off toward the door. ■

TO BE CONTINUED

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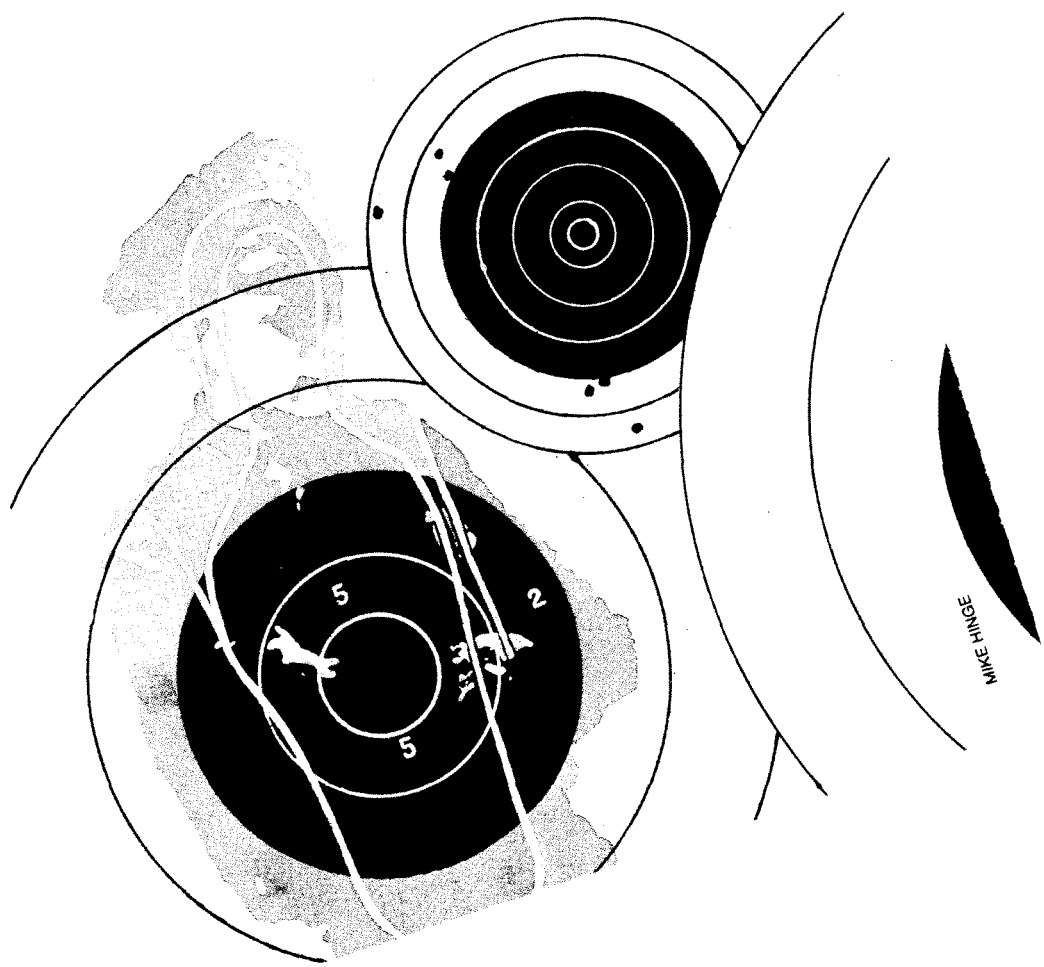
to keep and bear ARMS

A brief history of self-defense in the United States of America

JEFF MATTHEWS



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Published in connection with the National Tricentennial Celebration
New Bedlam, DC, 2076 A.D.

"A well regulated Militia being necessary to the security of a free state, the right of the people to keep and bear arms, shall not be infringed." Second Amendment to the Constitution of the United States of America, 1789.

"There is absolutely no reason why everyone in this country could not be armed by 1973." Art Buchwald, *Washington Post*, May 23, 1972.

"A well armed citizenry being vital to the commonweal, collective security, and Zero Population Growth of a Nation, it shall be the duty of all citizens, once having attained the age of reason (the seventh month of gestation), to keep and bear arms. Therefore, no citizen of these States, unless specially licensed as Congress shall provide, shall pass, on foot or conveyance, on any public thoroughfare, or otherwise appear in any public place, without displaying prominently on his or her person a loaded firearm." Fifty-fourth Amendment to the Constitution of the United States of America, 2064.

"It is clear that the Founding Fighters did not intend the constitutional obligation of self-defense in public to be construed as absolving a citizen of that same obligation in private. We, therefore, sustain the lower court's ruling against the plaintiff, who, being seated upon a porcelain sanitary facility in his home, was subjected to light to moderate automatic weapons' fire by his wife and four children situated in the corridor. The burden of legal responsibility is clearly on the party who is unarmed and, hence, unable to return fire in self-defense. Plaintiff's contention that he was 'caught with his pants down,' so to speak only emphasizes the truism that eternal vigilance is the price of life." Justice Swift for the majority, *Smith vs. Smith et al*, 2071, 69 U.S. 015.

"I will give up my gun when they peel my cold, dead fingers from around it." Bumper sticker pasted over the entrance to the First Church of Christ, Sharpshooter, in New Bedlam, DC.

As liberty and democracy enter upon their fourth century on the North American continent, it behooves us to stop and reflect: What has traditionally filled free people with a sense of their own worth and dignity? What has ever been the bane of tyrants and the crucible of just revolutions, be it the one which lead to the founding of the United States of America or Our Revolution of a few short years ago which reforged that Nation into history's finest expression of the idea that people have a right, nay, an obligation to defend themselves?! The answer, of course, is the concept of the sacred duty to "keep and bear arms".

We have nothing but history now to

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remind us that there once was a time when the average person walked the streets unarmed, completely at the mercy of criminal elements and the capricious brutality of armed "law enforcers". We are astounded to learn that *even athletes* were unarmed, helplessly exposed to fans, each other, and communist referees. (In today's fast-moving sport of baseball, for example, just imagine a catcher trying to throw out a base-thief instead of shooting him out!) The sanctity of the home was defended by watchdogs who did little more than watch, flimsy locks, peepholes in doors, electronic toys, and *maybe* one small caliber roscoe that couldn't wither a daisy off its stem, even in the hands of someone who could shoot—a rarity in those days. Today, why God help the thief who triggers a Low-Trajectory Lawn Mortar or a Welcome-Mat Fragmentation Mine! In short, there was a time when we were defenseless.

Originally, it was not intended to be that way. The Second Amendment to the Constitution of the United States said that "the right of the people to keep and bear arms shall not be infringed". (This Constitution, incidentally, replaced the earlier Articles of Confederation, which failed, say most modern scholars, simply because they contained no such clause.) This was clearly an expression of the right of the people to defend themselves *collectively,* to raise a State Militia, to protect themselves from the dangers of a strong national standing army. This interpretation admits of no doubt when the phrase "to keep and bear arms" is viewed in the context of the entire amendment and Article I, section 10, paragraph 3 of the Constitution itself. The burden of defense is a communal one and the responsibility of defending the Republic from aggression falls to the national government and its right and ability to raise an army. This was defined in a number of Supreme Court decisions issued collectively as *Selective Draft Cases* (1918, 245 U.S. 366).

But an implicit right to collective self-defense is by no means the same as the explicit duty of individual self-defense which we enjoy under the Fifty-fourth Amendment. We see, with historical hindsight, how various court decisions of the time were successful in defining, always in terms of the Second Amendment, the right "to keep and bear arms" in its broadest and most communal sense, usually refusing the narrower, more vital interpretation of individual self-defense. For example, *Robertson vs. Baldwin* (1897, 165 U.S. 275, 282) ruled that "the right of the people to bear arms (Art. II) is not infringed by laws prohibiting the carrying of concealed weapons." (sic!) The Supreme Court also ruled in *Presser vs. Illinois* (1886, 116 U.S. 252) "that although a state may not prohibit its citizens to possess and bear arms and so destroy the resources of the federal government for the protection of public security . . . it *may regulate* the right so long as it does not conflict with national legislation". [emphasis

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added] A number of state court decisions made it clear that the right guaranteed was that of bearing arms in the common defense and not arming oneself for the sake of settling private disputes. (*Commonwealth vs. Murphey,* 1896, 116 Mass. 171; *Salina vs. Blakesley,* 1905, 72 Kansas 230; *State vs. Keet,* 1916, 269 Mo. 206).

How, then, you ask, did private disputes ever get settled? Not very well. The history of gun abuse—that is, of citizens abusing their guns with improper loading and firing techniques and of citizens' rights being abused by the forced use of antiquated and dangerous weapons—is long, indeed. (No, Virginia, there was no Shooters' Advocate General in those days!) At the time of the Revolutionary War, rifles and the people who used them were so inaccurate that Benjamin Franklin recommended outfitting the armies with bows and arrows. In the Civil War, Union soldiers were sent into battle at Gettysburg with antiquated muzzleloaders.[1] The commotion of battle was such that it was often impossible to tell if the weapon had even fired and many poor wretches were found dead still holding rifles, the barrels of which had been stuffed with seven or eight successive loads, the previous ones never even having fired. Marksmanship played absolutely no role in those early infantry encounters; you just fired in the direction of the enemy and then staged a massive bayonet charge. The concept, therefore, of the well-armed "citizen soldier," willing and *able* to rush to the defense of the community, was, by and large, a fiction.

Despite the encroaching idea that defense was not a personal matter, the exigencies of winning the West required that man's basic right to go for his gun not be tampered with too severely. *The Shooters' Bible,* (Revised Standard Version) Luger, 2:14, tells us: "And the Red Hordes mounted on their faithful buffalo are more than filleth the land from overpass to cloverleaf and passeth beneath the Golden Arches in an eternity of Prime Times." (The expressions *"man's* right and *"his* gun" are not lapses into old anthrocentric grammar, but simple obeisances to the reality that in those days *women were generally unarmed!* Remember, the "Shoot First-Screw Later" amendment was not ratified until 1991.)

Though it can be fairly said that the courts were held at bay in the nineteenth century, the few state and municipal ordinances which actually required people to give their names and *be licensed* to carry weapons (here, again, there was nothing like our street-corner "Vend-O-Gat") were the first steps in what later threatened to become a stampede toward helplessness.

On the great teleological target range of Our Revolution, one sight points truer than all the rest, one metaphor of accuracy and dedication, the cross hairs which guided the itchy triggerfinger of Justice: the National

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Rifle Association![2] Founded in 1871 to train New York National Guardsmen how to hit what they were aiming at, the organization went through lean years—verging even on disbandment—until the National Defense Act of 1916. Three-hundred thousand dollars were set aside for civilian marksmanship training and the War Department was authorized not only to hand out arms and ammunition to civilian rifle clubs, but to provide shooting ranges and instructors as well. It was these patriots who successfully stifled every attempt by subversive and pusillanimous legislators (84% of whom are now known to have been homosexuals) to get the people to lay down their arms. Their struggle lasted well through the middle of the century, including the period following the infamous National Firearms Act of 1934 when they were actually forced to the unspeakable extreme of having to get licenses to go hunting with tommyguns and sawed-off shotguns.

Then, the 1938 Act forbade the interstate shipment of firearms to felons! In fact, you couldn't get any arms at all through interstate mail without becoming a registered "dealer," a privilege which cost an entire dollar! And on top of all this, a scant thirty years later, came the 1968 Gun Act, which was moderately successful in keeping cheap, foreign-made peashooters known as "Saturday-Night Specials" from being imported into the United States. The etymology of this quaint term is obscure. It possibly stems from the day of the week on which, and the weapons by which the first-born dope-pusher in each family was sacrificed in ancient American religious ceremonies.)

Think of it: three major pieces of legislation in thirty years and a public hoodwinked as late as November, 1974, into voting "Yes" in a public opinion poll to the question, "Do you favor the registration of all firearms?"! But the NRA fought and fought well. Although there are no really reliable statistics available, a conservative estimate would be that in 1970 there were about fifty million handguns and at least that many rifles in private hands.[3] This splendid proliferation of firepower was due largely to the fact that the NRA was able, by the judicious beshekeling of the right congressional pockets, to render the aforementioned pieces of legislation even more innocuous than they were, anyway.

In 1967 there were 12,000 murders, 250,000 aggravated assaults, and 200,000 robberies, perpetrated in 63%, 21%, and 37% of the cases, respectively, with the use of firearms—and, yet, there were those clamoring for gun-control! The ship was sinking and they wanted to throw away the life jackets! But the NRA knew that no dictatorship had ever been imposed on a people without first registering and confiscating private firearms. (This is, of course, still true today, as can be ascertained by anyone wishing to ask our brethren in the Soviet Republics of England, Wales,

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and Scotland what they think of the historical blunders which lead to their being disarmed some centuries ago.) Yes, the one million members of the NRA (1975) knew that guns didn't kill people, people did! that when you take away guns, only the criminals will have them! To his lasting credit there was still an American president in that year who was brave enough to say: "I am not going to recommend the registration of guns—or handguns, I should say. If we can find some more responsible ways to do it other than that approach, we will certainly consider them.[5]"

What sadder commentary on the individual's right to self-defense than that dark day in September, 1979, when a lone gunman perforated both houses of Congress with over 800 rounds of small arms fire and *not one* among that august body of lawmakers of "The Land of the Free and the Home of the Brave" was able to return fire! Or what more glorious day for the Republic than the one on which President Getty pinned the nation's highest civilian decoration onto his own chest for successfully having gunned down seven persons who had allegedly been thinking of assassinating him! Finally! A Chief of State willing to get down with the bad guys!

The situation going into the last quarter of the twentieth century was, however, far from clear. Although the Hart, Kennedy, and Bayh bills (to name only three of the hundreds before the congress of that time) had been squelched, there were, nevertheless, some 20,000 local and state gun-control laws in effect. Perhaps this accounts for the fact that in spite of the five million handguns being produced yearly (as of 1975) and the two billion dollars being spent yearly by gun owners on their artillery, they managed to shoot armed burglars of the home in only 0.2% of the reported cases!

Witness the case of Kenyon F. Ballew,[6] called by the NRA "the first American citizen shot down by the enforcers of the 1968 Federal Gun Control Act". On the evening of June 7, 1971, the apartment of Mr. and Mrs. Ballew was entered by agents of the United States Treasury. They were dressed bizarrely and held guns at the ready. This, combined with the fact that they had splintered the front door with a battering ram after only the most perfunctory of knocks, aroused considerable suspicion in Mr. Ballew, who, naturally, looked to the defense of himself and his family. Instead, however, of reaching for his .22-caliber semiautomatic pistol or his M-1 carbine or his 20-gauge over-and-under shotgun or his 12-gauge double-barrel shotgun or his 12-gauge pump shotgun or one of his two .22 rifles, he inexplicably reached for an 1847 .44 Colt black-powder cap-and-ball revolver. He was cut down before he could get off a shot. Except for the fact that he fell behind a cinder-block partition in his home and was spared the insurance rounds pumped in his direction by the strangers, he would

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A Calendar of Upcoming Events

3-5 March
TOTOCON II (Kansas area SF conference) at the Downtown Ramada Inn, Topeka, Kans. Guest of Honor—John Varley; Fan Guest of Honor—Gale Burnick; Toastmaster—George R.R. Martin. Banquet and films. Registration $6 until 15 February, $11 thereafter. Info: Totocon II, Box 2202, Lawrence KS 66045.

4-6 March
DESERTCON VI at University of Arizona, Tucson, AZ. Registration $5. Info: Desertcon, SUPO 10000, Tucson AZ 85720.

17-19 March
LEPRECON IV (Arizona area SF conference) at Los Olivos Hotel, Phoenix, AZ. Guest of Honor—Poul Anderson; Fan Guest of Honor—Fred Haskell. Registration $6 in advance, $8 at the door, $12.50 supermembership. Info: Leprecon IV, Box 1749, Phoenix AZ 85001.

17-19 March
ORANGE-CON 78 (Florida area SF conference) at Orlando, FL. Banquet. Registration $7 in advance, $12 at the door. Info: Orangecon 78, 6913 Mediterranean, Orlando FL 32807 (enclose S.A.S.E.)

24-26 March
MINICON 13 (Twin Cities area SF conference) at Leamington Hotel, Minneapolis, MN. Info: Minicon, Box 2128, Minneapolis MN 55402.

24-26 March
BALTICON 12 (Baltimore area SF conference) at Hunt Valley Inn, Baltimore, Md. Guest of Honor—Anne McCaffrey. Art Show, hucksters. Info: Kleeo Hondros, Box 2128, Capitol Plaza, Hyattsville MD 20784.

30 March-2 April
AGGIECON IX (SF conference) at Texas A & M University, College Station, TX. Guest of Honor—Philip Jose Farmer; Toastmaster—Wilson Tucker. Films, art show, hucksters. Info: AggieCon IX, Texas A & M University, Memorial Student Center, Box 5718, College Station TX 77844.

31 March-2 April
MONCON II (West Virginia SF conference) at West Virginia University, Morgantown, W.Va. Guests of Honor—Harlan Ellison and Stan Lee. Info: Moncon II, Student Organizational Services, Mountainlair, W.V.U., Morgantown WV 26506. (enclose S.A.S.E.)

—ANTHONY R. LEWIS

Items for the Calendar should be sent to the Editorial Offices, ***four months,*** *in advance of the issue in which you want the item to appear.*

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have been a dead man. As it was, he was only a paralyzed one. The raiders had been looking for an arsenal of hand grenades said to be in the apartment—said, that is, by a malicious and unfounded rumor which they had chosen to believe. Is it any wonder that sensible people in those days wanted to protect themselves?!

Such problems were fortunately resolved in the landmark case of *Volkswaffen Corporation vs. The United States,* 1995. Justice "Wild Bill" Wimberly argued persuasively for the majority: "Separate modes of armament are inherently unequal. The hitherto accepted and legally sanctioned concept of segregated weapons systems, the small-caliber variety for the private citizenry, on the one hand, and the more unconventionally lethal means of mass destruction reserved specifically for municipal, state, and federal forces, on the other, is discriminatory. This cannot but work to the disadvantage of those individuals concerned for their own protection, individuals who are, after all, entitled to equal protection under the law. We, therefore, urged the integration of all weaponry into all sectors of society with all deliberate speed."

History students will recall that no one argued persuasively for the minority, the dissenting judges having been "overruled" in a famous shoot-out, a ritual which now traditionally accompanies all Supreme Court split decisions.

In the last quarter of the century even members of the U.S. Congress were waking up to the fact that self-defense was an obligation. Sixty of them joined a new organization called the National Citizens Committee for the Right to Keep and Bear Arms,[7] claiming that the NRA had gone soft by coming out for a ban on certain types of imported cap pistols. This ideological schism was due partially to a misunderstanding: the NRA had simply been trying to protect New England gun manufacturers from foreign competition.

In the Manichean genesis of social change there seem times when the forces of good are at an ebb; but this is deceptive, for it can often be likened to a powerful spring compressing to its most compact point only to recoil again in full fury. And so it was with Our Revolution. New Year's Day, 1988. The Napalm Bowl. Cold with low overcast. The game between the Armed Welfare Recipients and the Golden Gun-Nuts. The former: fast, aggressive, well-organized, hungry. The latter: still in disarray after decades of vacillation and piecemeal anti-gun legislation, including the draconian Arms Act of 1981 which forbade the unlicensed use of the 105 mm recoilless rifle for hunting in downtown shopping areas. It was no contest and, indeed, the nadir of self-defense on this continent. Final score: Armed Welfare Recipients, 4,205 dead, 7,003 wounded; Golden Gun-Nuts, 16,271 dead, 22,550 wounded.

But, then, the Dawning of the Age of Rearmament!! The Bowl Games which swept the Republic on New

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Year's Day, 1994, six short years later, years in which the Good League had not been idle. During the legendary Long March they dug into their surplus arms from WW II, from Vietnam, from the ten-year occupation of the Oil Producing and Exporting Countries.[8] Then they returned and they swept the day. The results speak for themselves:

Good League	**Bad League**
Golden Gun-Nuts	vs Drug-Crazed Hippies
America's Finest	vs Subversive Elements
Your Sisters	vs The Nigras
The Silent Majority	vs The Pacifist Cringers
The NRA	vs The Mafia
General Motors	vs Armed Welfare Recipients
Totals:	
dead	
1,676,374	5,364,275
wounded	
8,263,587	17,435,852

(All body counts conducted by an independent survey organization.)

A rout! And what more thrilling example than the last few minutes of the Boarded-Up Storefront Bowl! America's Finest deep in a parking lot in their own territory, last and goal to go, all afternoon thwarted, but in the closing moments inspired by one of the gundom's all-time great forward artillery observers, I.M. Punk, calling down one strike after another from his vantage point in the enemy bleachers before, himself, succumbing to the wiles of an enemy kamikaze pom-pom girl! Then the Finest pressing forward, after the commercial message, to definitively "terminate the enemy with extreme prejudice"! All America rejoiced with the poet that night:

"I hear America shooting, the staccato chatter I hear,
The hitmen shooting theirs as they should be, blithe and strong,
The muggers shooting theirs to lift some coin,
The red-neck cop as he fires a warning shot into some nigger's neck,
The street hoods shooting theirs just for kicks,
The strong, onomatopoeic 'thwop' as the sniper's rifle rakes a college mall,
The democratic 'no!' of the assassin's piece,
Husbands, wives, and children all shooting each other,
Each one shooting what belongs to him or her and to none else,
The day what belongs to the day—at night the party of young marauders, robust, deadly,
Shooting with open bores their strong, melodious shots?"

And what shots they were! Ringing in the New Order with the new century! Ricocheting off the milestones of Our Revolution! That torchlight march to the seat of government! Eleven score years of national dedication to the principle of keeping, bearing,

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and *using* arms climaxing in that magic instant of the transformation of Capitol Hill into Capitol Crater!

A man's home really and truly became his "castle" through the Domestic Panoply Act of 2007, but not till the following year were spring, summer, fall, and winter finally abolished in favor of a perpetual open season on all comers. The New Homestead Act then granted to every man, woman, and child a sense of unlimited territorial imperative plus the hardware to enforce it with. Then—at last!—the fusion of NRA and government, the conjoining of the executive power of each into one individual, to be known ever after as Big Bore! Long Live Our Revolution!

To be sure, none of *us* will live very long, but if God had intended longevity to be a virtue, He wouldn't have blessed us with such a crop of brilliant, young bioengineers, to whom we are all indebted for technical marvels like WOTAN (womb-to-womb tactical nuclear missle system). Yes, even baby! And what parent doesn't live as long as possible just to hear baby's first word, be it "Colt," "Sharps," "Winchester," "Smith," "Wesson," "Thompson," "Kalashnikov," (a precocious baby-mouthful, that) or, simply, "B-B," (for the underachiever)—names which splatter bullseyes on the moving targets of history!

And you, gentle reader? You who are too young to remember being subject to painful pimples on the tongue if you lied on that mail-order gun coupon where it asked if you were a convicted felon? Will you throw away this freedom we have fought for, are still fighting for, and, God willing, will continue to fight for? What more fitting enjoinder from unarmed apathy than the words of Justice Bought in *Everyone vs. Everyone,* a case which our intrepid Temporal Expeditionary Corps assures us will be settled sooner than we think: "Face the wall and keep your hands where I can see them!" ■

NOTES

1,2. The stories about Benjamin Franklin, the Battle of Gettysburg, and information on the history of the National Rifle Association are from *Saturday Night Special,* Robert Sherrill, Charterhouse, New York, 1973.

3,4. The statistics on weapons in private hands (my 1970 figure is an extrapolation) and those on violent crime in 1967 are from *To Establish Justice, To Insure Domestic Tranquility: The Final Report of the National Commission on the Causes and Prevention of Violence,* Praeger Publishers, New York, 1970.

5. From a press conference with President Gerald Ford in May, 1975, quoted in *U.S. News and World Report,* May 19, 1975.

6. The case of Kenyon F. Ballew is from op. cit., Sherrill.

7. *Time* Magazine, October 6, 1975.

8. An account of American misadventures in Arabia can be found in *Every Child's Golden Book of Egregious Mistakes,* Wun-Mo Tyme, Resurrection of the Chairman Press, New Canton, Mars, 2014.

9. From *The Collected Works of Walt Hitman,* Carnage Press, New York, 2026.

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the reference library LESTER DEL REY

SCIENCE AND FANTASY:
Sometimes I get the feeling that Isaac Asimov may be right—a heretical idea, to be sure—when he suggests that I'm growing too old for this field, and that I'm sort of a living fossil. If not, life must be a lot less simple than it used to be; and that's an explanation that must be suspect, since those that use it as an alibi for their troubles usually are showing signs of senility.

There used to be reliable rules by which a man could adjust his life, as I remember. For instance, everybody knew that fantasy—as opposed to science fiction—didn't sell; nobody wanted to read that stuff. All scientists had closed minds, except the few that wrote science fiction; the fact that nobody would examine the ideas of Velikovsky honestly proved that. Science fiction ideas were too advanced for the general reader, of course, and would never get into the so-called mainstream. And the movies? Forget it! The general audience wanted monsters and never really appreciated the few genuine sf movies that were made. In sum, the only people who had both taste and intelligence were hard-core science fiction readers—including, one must concede, Isaac Asimov.

Well, I just got back from a trip to Los Angeles, where I attended the Third World Fantasy Convention. There was a time when the idea of a fantasy convention would have been ridiculous, but not now; there were a lot of people there, as devoted and active as any group of science fiction fans. And a number of editors from major publishing houses were also there, all apparently convinced that fantasy sold very well, as evidenced by the advances they were willing to give writers for fantasy novels—money that would have made science fiction writers drool only a few years ago.

Afterwards, I had a chance to talk to some of the people who were involved with *Star Wars*—a movie which any old-time sf fan would immediately recognize as pure space opera, filled with a lot of creatures, but no typical movie monsters. The book made from that has sold millions of copies and the movie has set new attendance records. Now it seems a lot of other moviemakers are interested in doing science fiction, and some are planning to base their movies on real science fiction stories.

Apparently, the long evolution of science fiction is beginning to reach far beyond its obvious limits. There was a time when the writers were struggling to find ways of handling its "wild" ideas and "fantastic" situations. But in more than fifty years, the necessary techniques have been developed. And the skills needed to handle other worlds for science fiction have spread to fantasy; I suspect that the influence of science fiction on the telling of fantasy has been more profound than even C. S. Lewis guessed. For that matter, science fiction has

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used more and more fantasy, while fantasy has used more attitudes and ideas borrowed from science fiction.

The ideas no longer seem so wild, either; this isn't just because science has developed rockets and atomic power, but also because the writers have learned how to handle those ideas in the human terms that good literature must always consider. This has made sf ideas available directly to a larger audience—and probably indirectly to most readers.

Lucifer's Hammer by Larry Niven and Jerry Pournelle (Playboy Press, 494 pp., $10.00) is an example. Larry and Jerry were both at the convention, looking rather pleased—and with reason, since the paperback rights to the novel have sold for $250,000. That price, incidentally, was paid by the publisher because the novel was not considered as science fiction, but as a story for the general reader.

Yet it uses two of the oldest science fiction ideas to be found. One is the cosmic collision idea; the other is the idea of survival after catastrophe. The novel doesn't sugar-coat the ideas, either, or attempt to reduce them to simplistics. There are a couple of love stories in the plot—but the love element never takes over and runs away with the main ideas; neither does the idea of horror get exaggerated out of its proper place.

In this case, Earth is about to be hit—and is hit—by a comet. This is something that has been very badly done in the past. But in this novel, the concept is made believable because the nature of the comet is based on the best guess that science can make for such a thing. It's made up of occluded gases, frozen liquids, and assorted hunks of solid material, as it most probably should be. The danger comes, not from the gases poisoning the atmosphere, but from those bits of solid material striking the Earth—pieces that represent incredible tons traveling at extreme velocities.

The effects of having such cometary debris strike Earth are calculated carefully. So far as I can judge, the results of the collision are not exaggerated, but are as honest as they can be. (This care in the handling of scientific speculation is something that few writers outside our field understand; here the background of sf writing by Niven and Pournelle shows clearly.)

Once the collision occurs, the story of survival begins. Here, naturally, Niven and Pournelle have to consider what happens in one pocket where such survival is possible. There can no longer be communication with the rest of Earth as a result of certain effects following the collision. The struggle to find a way of living through the first horrible year and—perhaps—to save enough of man's knowledge to begin rebuilding takes up the major portion of the novel. It's a grim story, sometimes an ugly one; but there is enough hope and intelligence here to avoid the gloom-and-doom tone that makes too many novels nowadays hard for me to read.

At the beginning, I found it sometimes difficult to keep track of all the characters. This is a long book—those pages carry almost double the number of words many novels do; and it takes a large cast of characters to make it convincing. Fortunately, there's a list of the main characters at the front of the book to make identifying each one

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easier. Later on, as the people begin to develop, that list becomes less necessary, particularly since the actions begin to center around only the main ones.

I don't intend to judge the book for the general reader. It seems to me that Niven and Pournelle have successfully fitted their story into the style needed for a good general disaster novel.

As a piece of science fiction, perhaps the collision part is the more interesting section. But I found it a thoroughly readable book and one which held my interest. And it seems to me that this novel should be one that can reach the general reader without boring the science fiction fan. There aren't many ideas that will strike the sf reader—but then, how many sf novels do contain new or striking ideas? Recommended.

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All My Sins Remembered by Joe Haldeman (St. Martin's, 184 pp., $7.95) is another matter entirely. This is obviously a book for the sophisticated sf reader.

This is also a type of book which I personally find much too frequently lately—the "novel" which is patched together out of the writer's shorter works. In this case, three novelettes dating from 1971 to 1977 make up the bulk of the story, with short bits between and around them to point up the basic idea. I suppose there's a big temptation for any writer who finds himself with enough short material about one character to decide to "novelize" it. And in some cases, where the writer sits down and uses the material to make a true novel, it works well. But too often, as in this case, the stories are simply patched together, rather than redone, resulting in little more than a collection.

Anyhow, the stories deal with Otto McGavin, Prime Operator for TBII—sort of a galactic CIA agent. He can be made to look like almost any character and can be given most of that character's memories and behavior patterns through hypnotic techniques. So adjusted, he is sent out to other worlds to masquerade as someone mixed up in doubtful activities and to find out just what trouble is brewing for the Confederacion.

Well, it's an interesting idea, by itself. But what happens once he gets to the worlds is rather less than should happen. In each case, he makes a fool of himself or is made a fool of. He is saved largely by accident from what I consider incompetence in the first story; is saved by the fact that a man is

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totally different from McGavin's expectations in the second; and is saved (?) by the arrival of another agent in the third. In other words, this Prime Operator, whom we follow for more than twenty years of supposed success in his job, simply goofs off in every case we see.

Apparently, this is intentional on Haldeman's part; the connecting bits seem to be designed to prove the cupidity and stupidity of governments, agencies, and agents. But such intent doesn't make the "novel" any more satisfying as fiction, where it fails rather badly as a result of repeated failure of the character. I'd suggest that Haldeman might well go back and reread his *Forever War,* where he made his point about the stupidity of the establishment without weakening his story in any way.

In all kindness, this is a novel better forgotten.

And speaking of fantasy, as I did at the beginning, there's one fantasy book that should definitely be forgotten. This is **The Book of Merlyn** by T. H. White (University of Texas Press, $9.95).

This is the "missing" fifth book of White's *The Once and Future King,* certainly one of the great classics of fantasy. It seems that White's manuscript went to the U. of Texas, where it was recently found. A great deal of publicity has been generated around this "missing" book, which is now on the list of Best Sellers. It is also making a very handsome profit for the publisher, I assume, since it's quite a short book, despite the price.

Unfortunately, there's a reason for my putting the word "missing" in quotes. Most of the material—at least of that which is of any real value to the story of Arthur as Merlin brought him up—has already been published in the first episode, "The Sword in the Stone." This material includes the episodes where Arthur becomes an ant and later a goose. The two episodes occupy a good deal of the limited wordage of the "missing" book. The remaining material that is new is unfortunate, in my opinion; it tends to detract from, rather than add to, the characters of Arthur and Merlin.

I don't know what happened when the original book was edited, of course. But my guess from the results of that editing is that this fifth book was judged unsuitable, and the ant and goose episodes were lifted and moved to the first section (where, incidentally, many readers have always considered them inappropriate). White apparently was badly shocked by World War II and wrote book five as a diatribe against that; as such an ending to the other four books, it may speak well for his heart, but not for his head. And I have to agree with the editors of the original edition that the right ending came at the conclusion of book four, when Arthur sends a young man named Mallory off to let the world know of his story. I don't agree that the two episodes should have been added to the first book (if, as it seems, they were so added). But that's unimportant.

However, it is important that readers who are paying for new material should get such new material, or so it seems to me. Great fantasy has always been rare, and the original edition was one of the great books in the field. Now that fantasy has again become a

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NOTES TO A SCIENCE FICTION WRITER

BEN BOVA

Straight from the shoulder talk to the short story writer from the Editor of Analog

". . . in story after story I see the same basic mistakes being made, the same fundamentals of story-telling being ignored . . . simply because the writer has forgotten—or never knew—the basic principles of story-telling."

Ben Bova discusses vital aspects of the science fiction short story—character—background—conflict—plot—and more!

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successful category to some extent, the magic name of T. H. White may insure a good sale of a book, but this example of his work is hardly going to delight readers who already know his *King*.

Pass it by!

There's a nonfiction book which you shouldn't pass by, however, (I did, the first time it appeared in 1976. Now I'm glad there's a 1977 printing to lure me into reading it.) This is **The Selfish Gene** by Richard Dawkins (Oxford University Press, 224 pp., $8.95).

This has nothing to do with the controversy over whether there should be experiments at altering the genes of microscopic things or trying to change the genes in humanity. It's really another look at the basic nature of humankind—and all living kind. It starts by reexamining just what we are. The answer is that we're all nothing but "throwaway survival machines" for our immortal genes. At least, that's the way our genetic material would have to consider us, if it were sentient—as it may seem to be in the long run. And since the gene, in one form or another, has been here from the very beginning and will go on as long as there is any form of life, maybe we should look at the human animal as just another machine that can carry its genes forward another step in time.

It seems that Dawkins has made a fairly simple assumption for his book. But when fully examined, that assumption tends to upset a lot of the ideas that Konrad Lorenz and Robert Ardrey have helped to make popular.

Dawkins is a contentious writer at times. But he's also a very skillful one. His book reads very well, and his mind seems thoroughly at home in making his ideas into ones that can be analyzed and extended by the reader.

Strangely, the book is far from pessimistic. It would seem that turning men into mere machines for the use of the genes would reduce humanity to about the lowest possible level. But Dawkins doesn't see things that way. He points out that in a sense, the genes have perhaps built themselves a creature in man that, for the first time in billions of years, is capable of detecting the trickery of those selfish genes and overruling them. Apparently, the whole can be greater than the sum of its genes.

A fascinating and different look at life. Recommended.

For anyone interested in the Velikovsky controversy, there's finally another nonfiction book that should be *must* reading. This is **Scientists Confront Velikovsky** edited by Donald Goldsmith (Cornell University Press, 176 pp., $8.95). This contains four papers that were delivered at a symposium of the American Association for the Advancement of Science in 1974, by Norman W. Storer, Carl Sagan, J. Derral Mulholland, and Peter J. Huber. There is also a paper by David Morrison on astronomy and catastrophism, not presented at the symposium. (There was also supposed to be a paper by Immanuel Velikovsky, but though the deadline was twice extended, his paper was not received in time for the book, as is explained in the introduction.)

The symposium should have been an answer to those who demanded that

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scientists consider and debate honestly the ideas of Velikovsky. The papers do treat *Worlds in Collision* thoughtfully, rather than with the outbursts of indignation and name-calling that filled too many letter columns at one time. And the fact that such a symposium could be held before the prestigious AAAS with Velikovsky invited to participate lends added value to the papers printed from that meeting.

Carl Sagan's article with its detailed analysis of Velikovsky's book is easily worth the price of purchase here. It is a closely reasoned and excellent examination of what science finds when the ideas of Velikovsky are studied without automatic anger. To my mind, this is a complete refutation of Velikovsky; obviously, many will deny this.

But whatever side you may choose to follow, this book *and* Velikovsky's should be read carefully by anyone who wants to get into the argument.

Finally, as a lot of readers have reminded me, I made a serious error in a recent column, for which I apologize. Marion Zimmer Bradley's *The Forbidden Tower* is a splendid book, but it isn't a sequel to *The Winds of Darkover,* as I stated; it's an immediate sequel to *The Spell Sword.* I had both books sitting on my desk and for some reason typed out the title of the wrong book, though I certainly knew better.

But, as I hinted at the beginning of this column, I'm perhaps growing too old for the field. Don't write me to agree, however; I'll have enough trouble with the Good Doctor Asimov about my hastening senility! ■

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Brass tacks

Dear Ben,

I'd like to comment on something Barry Malzberg wrote in 'The reference library' (Analog, October 1977): "Science Fiction, like jazz or the automotive concept of dynamic obsolescence is absolutely and uniquely American . . ." Now Mr. Malzberg is a fine writer, but he shows here a complete ignorance of SF history, like, I'm sorry to say, so many other American connoisseurs do. They all, like Mr. Malzberg, seem to think there isn't (and never has been) any SF outside the USA and Britain. Or at least not in Europe, because they recognize Australia as a minor source of SF writing. Excuse me, gentlemen, but this is wrong. First of all, SF existed already more than hundred years ago in Europe: Jules Verne is an example we do not have to mention, although I recognize most of his novels are plain adventure-stories. Another is the Belgian-French (born in Belgium, but he lived most of his life in France) writer J.H. Rosny aîné (aîné meaning 'the older', or 'oldest', Sr. if you want)—born in Brussels in 1856 and died in 1940. His real name was Joseph-Henri Boêx. Long before Wells, he already wrote SF: "Les Xipéhuz" (1887), "Le cataclysme" (1888), "Un autre monde" (1895), "La mort de la terre" (1910) . . . Other writers of the period before W.W. I: Gustave Le Rouge ("Le prisonnier de la planète Mars", 1908—The prisoner of Mars, and many other books); Jean de la Hire (1978-1956) ("La roue fulgurante", 1908); Maurice Renard (1875-1939) ("Le peril bleu", 1910); Robida, Leblanc, . . . All these are French, and I suppose more names can be given for Germany, Italy and other West European countries. There is no doubt that in no other country than the USA SF became this important, but to say that American writers have a monopoly on it is a mistake.

Except for this detail, however I

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enjoyed Analog, as always. I wish you the very best with it, and may we also read more novels of yours.

GUIDO EEKHAUT
Diestsestraat 34 bus 1
B-3000 Leuven
Belgium

And what about Cyrano de Bergerac?

Dear Mr. Bova,

I found the August article on the law of outer space, by Arthur Dula, both informative and well timed. There have been a number of reports in the news media recently detailing the development of so-called "hunter-killer" satellites by both the U.S. and U.S.S.R. The concept involves deploying armed, remotely controlled satellites capable of destroying enemy communication and spy satellites. To science fiction fans, who have high hopes for the scientific and social advancements to be made as man moves into space, this must come as disappointing and alarming news.

In your introduction to Mr. Dula's article you posed the question, "Can a set of laws be developed to guide people to behave acceptably in a new social and environmental milieu?" That is indeed the heart of the issue. As we move out from Earth we have the unique opportunity to set up entirely new societies shaped by laws and principles carefully planned ahead of time. Hopefully we can leave behind the killing and wars, and other regrettable aspects, so common in our current societies. For this to be possible, however, we must recognize the hunter-killer satellite as an unacceptable precedent for the development of space law. To allow this first intrusion of offensive weapons into space will endanger all further peaceful enterprises beyond Earth.

Readers of science fiction have a special interest in the peaceful development of space and we must not let our dreams be destroyed. I believe the hunter-killer violates the spirit if not the letter of current treaties concerning the peaceful development of space. If it does not, it should be included in new treaties or even banned in the next SALT agreements, but it must not be allowed into space. I appeal to your readers to write to President Carter, to their Congressmen and to members of the science and technology committees in Congress and express their opposition to the hunter-killer in the urgent tones that are most appropriate for this issue.

DAVID BORER
531 Baker Ct.
Upper Sandusky, OH 43351

The U.S. has no publicly-announced programs for "hunter-killer" satellites. But as space operations become important and valuable, we will have to take the steps necessary to protect our hardware and our people.

Dear Ben:

Like Jerry Pournelle and Robert D. Smith (Brass Tacks, Sept., 1977) I've also hit the baffles in re psionics, generally and the Hieronymus and Delawarr devices in particular. Having devoted considerable time digging for additional information while writing a book on psionics, eloptic energy, radionics, psychotronics (or any of the labels used in this context) I am firmly convinced by evidence published and unpublished that "something is there."

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I'm equally convinced of two other factors: (a) that the dowsers and psionics experimenters who have independently conceived, built and patented psionic/radionic "machines" have no clearly defined theoretical model of the modus operandi the postulated exotic energies their devices are supposed to manipulate, and (b) that the brain alone is incapable of receiving and/or transmitting these energies without the amplification of the geophysical electromagnetic/gravitational field in which the organism is immersed.

I can't dowse successfully and have had limited practical experience with my own radionic "transmitters" and "receivers." But I have observed others who could and did—as well as those who made what seemed very extravagant claims. All in all, the most sorely needed link in the area of psionics is a system of communication and of checks and balances to cull out the crazies. Your response to Robert Smith's letter ended with the question "Can anyone design a 'tight' psionics experiment?" is certainly provocative. I'm sure there are a handful of radionics experts who might come up with one.

A psionics newsletter might be a good way to start. If there is enough interest out there to support it, I'm certain we could persuade someone to launch such a project.

JOSEPH GOODAVAGE

There may be "something there," but until it is demonstrated unequivocably and repeatedly *most people are not going to take psionic devices and/or ESP very seriously. Communication is important, but repeatable demonstrations are even more so.*

Dear Ben:

With all due respects to Heinlein and his many fans, emphatically including me, TANSTAAFL is dumb! (September Brass Tacks—D. Carew).

All of us, left, right and middle, know There Ain't No Such Thing As A Free Lunch—but if I Eat and You Pay, it's just as good.

IE-YP is the economic rock on which liberalism is built, and there is no conflict with the second law of thermodynamics.

Of course, sooner or later I'll have to use a gun to make you keep on paying, but that is a matter of politics, not science.

HOWARD W. MARTIN
5542 Limerick Drive
St. Louis MO 63128

TANSTAAFL—like the Second Law—doesn't care who does the paying. The point is that the lunch ain't free. Many people seem to think that it's perfectly okay to cheat or steal from a corporation, because "nobody gets hurt." Somebody *always pays for that free lunch, and that somebody is usually the American taxpaying consumer.*

Dear Mr. Bova:

Your September issue was great. Every story was a read-through. And your editorial "Problem Grokking" was especially provocative and I agree 100% on every item but one. You say that the president of General Motors isn't facing the problem. I think he is—as it affects him. His immediate problem is selling cars now. His hard-nosed attitude probably stems from the fact that it isn't likely that he will be around a 100 years from today. Get

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it now while you can. Why worry about your children's children.

Although you cut sharply into each problem and offer clear-cut solutions, doesn't this leave an unvoiced problem? Who will attack and attempt to correct these problems? Who'd have the nerve to casually stroll into the snake-pit of public opinion? Surely not the career politician. He's going to look the other way as hard as he can. Perhaps an unorthodox solution is needed. A "Self-destruct" type of politician. Someone who's not going to be around too long. A new governmental post to denote a controversial issues short-term politician. He could pursue the issues that would mean ruination for the career politician—with which we seem to be plentifully supplied.

Anyway, Mr. Bova, this is food for thought. Any volunteers out there???

ROBERT W. NELSON
3325 N. Lincoln Ave.
Chicago, IL 60657

One way to achieve "self-destruct" politicians is to limit every *office-holder to two terms—just as the President is now limited by the Twenty-Second Amendment. This would break up the entrenched politicians to some degree, and create a demand for more participation by people who do not now run for political office.*

Dear Mr. Bova,

In answer to Mr. Blake's inquiry (Brass Tacks, October 1977), there is a clearing-house for information on low-energy systems and related subjects. In fact, there are several. The most general, and perhaps the best, is *Alternative Sources of Energy Magazine* (ASE, Route 2, Milaca, MN 56353; issued quarterly, it was $6.00/year last I heard). For information on some of the other periodicals, which tend to be more specialized, consult *Energy Primer: Solar, Water, Wind, and BioFuels* (1974; Portola Institute, 540 Santa Cruz Av, Menlo Park, CA 94025; $5.50). The *Energy Primer,* which was prepared by *ASE* along with several other groups, provides some general information on "alternative" energy systems along with extensive bibliographies, lists of research groups, and lists of manufacturers.

Another publication which might interest Analog readers is *The CoEvolution Quarterly* (Box 428, Sausalito, CA 94965; $8.00/year), which publishes "alternative" energy in the "Soft Technology" section of each issue. Also, the *CQ* has given a great deal of coverage to Dr. O'Neill's L-5 colonies—they devoted 26 pages of the Fall 1975 issue and 76 pages of the Spring 1976 issue to the subject, including material by Dr. O'Neill, Carl Sagan, T.A. Heppenheimer, Russell Schweickart, and others.

PETER ROBERTS
243 Rockingham Rd.
Pittsburgh, PA 15238

Low-energy systems, such as solar heating for homes, offer the possibility of decentralizing much of our energy needs, and removing the homeowner from total dependence on oil companies and utilities. The social changes that this brings about should be at least as interesting as the technological developments.

Dear Mr. Bova:

Thanks for printing "Have You Been Converted?" in the September issue. There are still a few of us who prefer the English system as more

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convenient for certain uses, and I think the author was trying to speak up for us.

A minor quibble, however. Even if the alien's foot was resting on little Ezra, Penny probably would use the more conventional "Un one-tenth meter my child," etc. The hand, a perfectly legitimate measure, is equal to four inches.

Another measure we will lose if we insist on using the metric system for everything is the finger, about three-quarters of an inch. So perhaps bartenders will be among the last to convert. Walk into a bar twenty years from now and say, "Let me have two centimeters of scotch straight up," and more than likely the bartender will give you a finger. Old ideas die hard.

LEONARD PALLATS
16651 8th Pl. SW
Seattle, WA 98166

In other words, the bartender would be giving you the *finger, as well as* a *finger.*

Dear Mr. Bova:

Reference "Have You Been Converted?" in your September, 1977 issue. Not a funny story, and lousy conversions. Demonstrates a poor knowledge of the English language as well as of the Metric and English systems of measurement. Tacky.

(MRS.) J. C. POCKEL
21 Dwight Street
Boston, MA 02118

You can't please everybody, although every other comment about Rachel C. Payes's story has been favorable.

Dear Ben:

I truly enjoyed your editorial in the September issue. So right: any problem must be considered in its entirety. This is no less than the "systems" approach—a science, or perhaps more realistically an art—that is still developing.

One of your cited problems deserves further comment. In "grokking" the situation of illegal immigrants in the U.S., a factor that seems to have been overlooked is the effect of the minimum-wage law in this country. This law tries to thwart every tenet of classical economics. With the best intentions in the world, it has demonstrably had the effect of reducing employment for the young and the disadvantaged, as well as encouraging connivance by employers in illegal immigration.

Getting now to the Club of Rome studies . . . Computer forecasts of the effects of proposed legislation should by all means be made. But, Good Lord, how do you mathematically-model the Universe and all the people in it? "The Limits to Growth" has had plenty of criticism from very knowledgeable scientists. Even Jay Forrester has not tried (to my knowledge, at least so far) to predict the effects of pending legislation.

However, some work *is* being done at M.I.T., and no doubt other places, in the realm of public policy. . . . This work should be encouraged. I would welcome an article . . . describing what is being done in the field of science as an adjunct to public policy and legislaton.

CHARLES H. CHANDLER
27-D Hampshire Drive
Nashua, NH 03060

So would we. Several writers have pointed out that such work is being

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done, and we are trying to get an article on the subject for an upcoming issue.

Dear Mr. Bova,

This is in response to Michael Bank's letter in your October "Brass Tacks". Mr. Banks is distressed at our failure to develop a technology independent of fossil fuels back in the 1950s. You reply by condemning the power companies for failing to develop such alternatives. ("It wasn't the conservationists, but the power companies, who have ignored new technology for more than a generation.")

You both ignore the price mechanism. When fossil fuels are cheap, you don't need to develop alternatives. When fossil fuels are more expensive, you begin to investigate solar power, etc. Castigating yourselves, or the power companies, or the conservationists for treating a relatively cheap good as a cheap good, and not as an expensive one, is comparable to blaming a country with cheap labor for not using more capital-intensive methods of production. In both cases, people are only guilty of getting their information about the relative scarcity of resources from the prices they observed.

When prices change, you use different methods of production.

D. J. BROWN

221 S. 7th St.
Lafayette, IN 47901

But that's much too late in the game! It's not enough to cruise along happily with your eyes shut, and no one looking ahead. That's what happened to the Titanic, *and it's what's happening to our whole energy-demanding society.*

In times to come

● **We live in an age of mass production, and tend to think that vehicles of transportation—automobiles, trains, ships, aircraft—are cranked off production lines that are increasingly automated and dehumanized. True enough. But the most complex transportation vehicles yet manufactured—spacecraft—are literally hand-built. The technology is too new, and the failure-tolerances too strict, to trust anything but the most painstaking of human effort in building the ships that carry our best men, and most sophisticated instruments, far beyond Earth's friendly skies.**

What about the far future, when we begin building starships? How will they be built? And by whom? Donald Kingsbury—known to regular Analog readers as a scientist who's been involved in nuclear propulsion ("Atomic Rockets," December 1975) has produced a fine novelette that blends high technology with fascinating cultural evolutions. It's titled "Shipwright," and it will be featured in our April issue—together with another striking painting by Hugo-winning Rick Sternbach.

The science fact article will be "In Search of the Bootstrap Effect," by Russell Adams, the first comprehensive survey of all the work that's been done—and is being done—to develop a workable Dean Drive-type of unidirectional thrust device.

We'll also have the conclusion to Joan Vinge's novel, "The Outcasts of Heaven Belt," and—space permitting—short stories by Orson Scott Card, Wilson Tucker, and others. Plus all our regular features and the results of our First Annual Analytical Laboratory vote. All in April's Analog!

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Dear Mr. Bova:

A few words, please, about a story in September's issue, *The Astrological Engine* . . .

A cute story, I suppose, but there is no need for such a calculator. Do you know how ridiculously easy it is to cast an accurate horoscope? If you can find your way around in the *American Ephemeris and Nautical Almanac,* you'd have no trouble. The story did have one truly touching moment, though—that of the certified AFA member struggling to write the user's guide!

On the other hand, you may be right. These days, some people can't put 2 and 2 together while their battery recharges.

Thanks for the fun.

KATHY WATTS
8577 Brae Brooke Dr.
Lanham, MD 20801

Sure, there's no need for such a calculator. But since when have successful consumer products been based on actual needs? Make an "astrological calculator" and you'll sell them to people who would never buy an adding machine!

Dear Mr. Bova:

Re: your reply to John Isaac's letter in the October ANALOG.

First, do you *really* believe that *all* students should learn in school is to *read and write essays*? Even the most short-sighted conservatives in the back-to-basics movement include computation on that list and some of us would even like to include critical thinking and logic.

Second, since essays must be about *something*, essay tests administered by an organization external to the school system implies that the external organization gets to impel both content and style. (Your *real* educational objectives are what you give credit for on tests, after all!) How many of us have been graded down on an essay in school for "style" and "logical development" because our essay opinions didn't agree with the essay grader's? I agree that external evaluation is a good idea, but who gets to set the criteria besides you and me and our trusted friends? I'd rather take my chances with individual teachers.

Third, you're assuming that *the only function of schools is to educate* the students and that's not true. In our society, schools keep kids off the streets and out of the job market—i.e., schools fulfill a babysitting function. If a teacher averages 25 students per day for 180 7-hour days (about the national average for a precollege classroom), that teacher's salary should be $31,500 per annum based on $1.00 per child hour babysitter's wages. Obviously any extras like education of the babies should cost society more money.

Fourth, in suggesting that teachers be held accountable for the results of their work by pro-rating their salary to the percentage of their students who pass the test, you make several incorrect assumptions: (a) teachers have the authority to manage students' education as they see fit; (b) all teachers work with equally gifted raw material; (c) schools are the only (or at least the major) influence on student learning; and (d) students should not be responsible for their own learning.

Fifth, in our society, our most "successful" citizens often pay no taxes. If students who pay no taxes are to

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endanger a teacher's job, a truly outstanding teacher might be endangered just by our idiotic tax structure.

BILL LAMB

Boyle, MS 38730

Reading and writing are not the only skills that students should learn, but they are basic to everything else, and they are being taught so poorly today that we are graduating upwards of a million functional illiterates every year from the nation's high schools. And if the schools have functions in addition to educating the students, those additional functions must be made secondary to the prime function: education. If teachers will not bear the responsibility for educating students, then they should get into some other line of work; perhaps they could find employment in some government bureaucracy, where passing the buck is a standard operational procedure.

Dear Mr. Bova:

The October Analog's focus on weapons in space was timely. However, only Paul Nahin's article on the Laser BMD touched on the arms control aspect of this problem, and that only from an ABM perspective. We need further public discussion of the prospects for arms control in space, before technological competition decides the issue.

There are signs of high-level interest in controlling weapons in space and weapons which could be used against satellites and other space systems. President Carter stated at his March 9 press conference that he had proposed to the Soviets that "we forego the opportunity to arm satellite bodies and also . . . the opportunity to destroy observation satellites." It is public knowledge that antisatellite arms control was one of the issues to be discussed by the U.S. and the USSR in the aftermath of Secretary of State Vance's visit to Moscow in March. On May 22, in his foreign policy speech at Notre Dame, President Carter again called attention to the issue by saying that we want "no attack capability against space satellites . . ."

It is clear that existing treaties are not enough to prevent potentially destabilizing weapons developments; the 1967 Outer Space Treaty bans only weapons of mass destruction in space, and there is no precise agreement as to what that term includes. There is no agreement prohibiting the development, testing, or deployment of antisatellite systems; agreed restrictions on use are narrow (e.g. the prohibition on interference with National Technical Means of verification in the SALT and ABM treaties). Last year, a Stanley Foundation conference called for a ban on all systems which could damage satellites, and a ban on any kind of weapon in space.

We may be at a turning point in an arms competition which could affect the human future in space as well as on Earth. Agreements controlling antisatellite systems and weapons in space would be tough to negotiate and verify, but would be worth the effort. Let's hear more about this.

MICHAEL A. G. MICHAUD

8801 Lowell Street

Bethesda, MD 20034

But is our existing "balance of terror," based on ICBMs, better than having laser-armed satellites up there protecting us?

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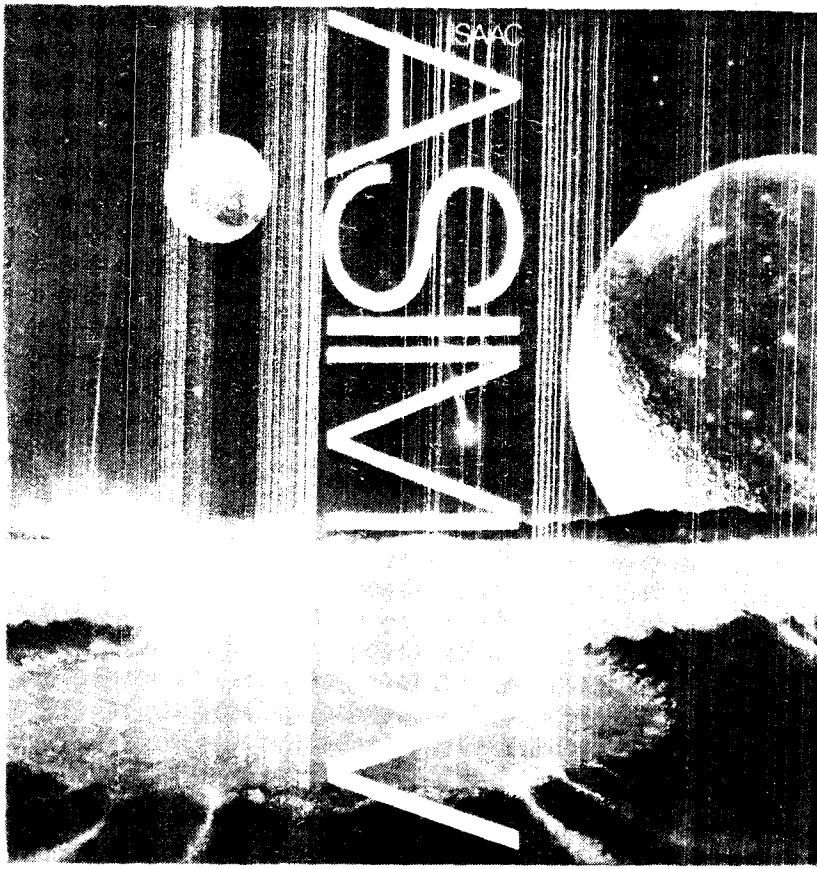

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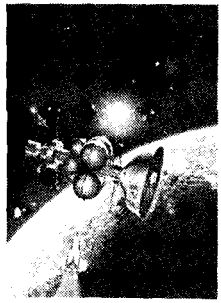

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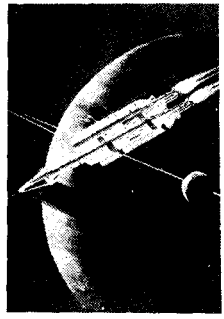

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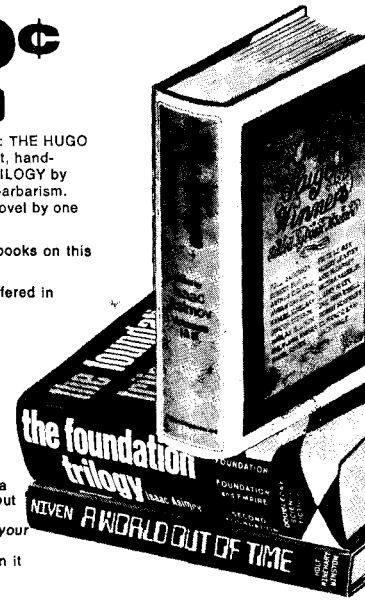

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